The

Electrical Review

VOL. CV. NOVEMBER 29, 1929. No. 2714.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman and Joint Managing Director: G. H. ALABASTER, Assoc.I.E.E.

Technical Editor: C. O. BRETTELLE, M.I.E.E. *Joint Managing Director:* E. A. GATEHOUSE, M.I.E.E., A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 8871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 6d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Contents:

	PAGE
Low-temperature Carbonisation	933
The B.E.A.M.A. Dinner and Monograph	934
Domestic Electricity Supply in France	934
Expert Witnesses	934
The Point Five Domestic Rate	935
The Swiss Federal Railways	935
The "Electrical Review" on the Bookstalls	935
The Works of Veritys, Ltd. (*illus.*)	936
An Auto-Condenser, by A. M. Codd (*illus.*)	940
Automatic Combustion Control, by C. H. S. Tupholme (*illus.*)	942
Our Overseas Electrical Markets (*illus.*)	944
The European Glow-lamp Cartel	946
Electricity for the Home (*illus.*)	947
Domestic Tariffs: 0·5d. (or less) per kWh.	948
Business and Industrial Notes	949
Lighting and Power Notes	954
Tramway and Railway Notes	955
Telegraph and Telephone Notes	955
Radio Notes	956
Contract Information	956
Forthcoming Events	958
Notes	958
Our Personal Column	960
Financial Section—	
New Companies Registered	961
Official Returns of Electrical Companies	962
Financial Section—*contd.*	
City Notes	962
Stocks and Shares	963
The B.E.A.M.A.	965
A Comprehensive Industrial Survey	966
Super-Voltage Measurement (*illus.*)	967
Low-temperature Coal Carbonisation	968
New Electrical Devices, Fittings, and Plant (*illus.*)	971
Standard Intermediate Voltages, by R. B. Matthews	972
The Public Works Exhibition	974
Legal	975
Correspondence—	
Two-Part Tariff Prepayment Meters	976
Rationalisation and Labour	976
Standardisation of Size of Advertisement Pages	977
The Point Five Domestic Rate	977
Specially Designed Cooking Utensils	977
Power Consumers and Peak Loads	978
Small Hydro-Electric Schemes	978
The All-Electric Home	978
"So Near . . . ."	978
Smoothing Circuits	978
Parliamentary News	979
Published Specifications	979
Trade Mark Applications	979
New Work for Contractors	980

Low-temperature Carbonisation.

THE production of electricity is, from the thermal aspect, admittedly inefficient, and much engineering thought has been devoted to the low-temperature carbonisation of coal as the most promising means of remedying the position. The disappointments which have in the past attended the commercial results of coal pre-treatment make welcome an occasional reminder that steady progress is being made towards a solution of the problem.

The three papers describing recent developments in Great Britain, the U.S.A., and Germany, which were read before the I.E.E. last week, are evidence that this progress is real and also contain promise that this form of coal distillation has an important future. The crux of the situation is, of course, that the capital and operating charges of the pre-treatment plant must be met by finding a market for the gas, tar-oils, and coke at a total price sufficiently in excess of the cost of the raw coal. It is of interest to compare the methods employed in the three cases to secure the requisite surplus. In the Milwaukee plant, which was designed on the basis of experimental work carried out in England, the margin is derived from the sale of gas to an undertaking under the same control, but the price obtained (2s. 6d. per 1,000 cu. ft.) is much in excess of the bulk value of gas in this country. Constancy of operation is obtained by storing the gas and pulverised semi-coke, as the latter can, unlike raw coal, be stored for an indefinite period.

The position in Germany is complicated by the necessity for the efficient utilisation of brown coal from open workings with a low calorific value and a high moisture content; from such coal over 60 per cent. of the kWh sent out by public supply authorities is generated. The tar has a value two and a half times that of the semi-coke, but, as its price fluctuates, the generation of electricity provides the stable basis. Preparations are being made, however, to include public gas supply in the plan of operations. Pit-coal in Germany contains too little tar to pay for its carbonisation in conjunction with electricity works.

The Dunston plant was described in the ELECTRICAL REVIEW of October 5th, 1928. It is the only one of those dealt with that was designed for the direct purpose of cheapening the cost of electricity, as well as that of the economical utilisation of raw coal. The margin required to pay for pre-treatment is obtained from the sale of the

oils, the semi-coke and gas being credited only at their heat value. The gas (80 B.th.u. per cu. ft.) is burnt under the boilers. It has recently been suggested that another use might be found for the gas in inter-stage steam reheating in the turbine room at a reasonable capital cost and without many of the complications which accompany existing methods.

An important feature of the Dunston plant is that it treats ordinary steam coal, which is cheaper than most coking coals. The cash value of the tar products amounts to 8s. 11d. per ton of raw coal, and, after allowing for reduction in heat value and for losses in operation, the surplus over the cost of the raw coal (11s. per ton) is 57 per cent. Whether this presents margin enough to pay for the installation cannot be conclusively judged from the paper, as owing to the plant having been built up over a number of years by a process of "trial and error," no useful figures could be given. The fact, however, that the installation is to be extended appears to indicate that the commercial results are comparable with those obtained from the firing of raw coal. If they are no worse, with due allowance made for variations in the market value of the tar products, wider considerations would justify the adoption of low-temperature carbonisation. The authors postulate the necessity, if the best results are to be obtained, for continuous working at high load factor, a condition which obtains on the North-East Coast, and which will become general throughout the country when large generating stations carry the base load.

The B.E.A.M.A. Dinner and Monograph.

The British Electrical and Allied Manufacturers' Association is to be congratulated upon the way in which it always gets together a distinguished company at its dinners. This year nearly everybody of note in the industry seemed to be present, while no fewer than five members of the Government were also there. Lord Derby was, as usual, full of glowing good humour, and there was pleasant raillery between him and Mr. J. H. Thomas.

The latter, not for the first time, stressed the fact that while work could be provided by the expenditure of money, mere spending was not the solution of our difficulties. Only schemes which were economically sound could provide that solution, and particularly any schemes for improving the export trade by which we lived.

Sir Felix Pole, whose obvious grasp of the electrical situation discounted his rather excessive modesty, drew an apt parallel between the electrical manufacturing industry and the railways to justify the difference between home and export prices, or ordinary and excursion fares. Later, Mr. V. Watlington also turned to the railways for an analogy. He said that although the railway companies protested against several electrical manufacturers tendering the same price for similar articles, they rigidly adhered to "price maintenance" themselves.

Lord Derby showed how his opinion of the present Government as individuals altered when he considered them collectively. He revealed his acquaintance with a Labour periodical which Mr. H. Morrison considered a first step towards a change of political allegiance.

The Minister of Transport's speech might appropriately have been delivered at an E.D.A. campaign meeting. He showed a thorough knowledge of the advantages of electricity arising from an intimate acquaintance with electricity in his own home. He urged electricity supply undertakings not to be content with high prices and quick profits, but to abandon the "safety first" attitude and take a little risk with the practical certainty of ample reward.

The atmosphere was an optimistic one, and there seemed to be a genuine desire on the part of the Government representatives to co-operate with, and assist, the industry to go further still upon the road of prosperity.

Another B.E.A.M.A. matter of some importance is the publication this week of a comprehensive survey of the British electrical industry and its relations with other industries and with other countries.

A vast amount of matter has been digested and correlated in producing this monograph and it should prove of great service to all students of the economics of the industry as well as to electrical manufacturers and electricity suppliers. The first instalment of a review of the publication appears in this issue and we hope to complete it next week.

Domestic Electricity Supply in France.

The endeavours to popularise the consumption of electricity for the purpose of domestic cooking are, of course, not confined to our own country. At the present moment the question is attracting a considerable amount of attention across the channel, and in the recent issues of *l'Industrie Electrique* a discussion on the relative economic values of electricity and gas in the kitchen has occupied a good deal of space. The question appears to have been opened by a correspondent who asked naïvely what was the electrical engineer's opinion of the relative costs, taking all the factors into consideration. This question provoked a long article on August 10th by Monsieur Hayet, consulting engineer, in which, after having produced several complicated tables and curves, he arrived regretfully at the conclusion that in Paris electricity for cooking purposes was, last June, 50 per cent. dearer than gas In arriving at this conclusion he takes a cubic metre (35.3 cu. ft.) of gas as being equal to 2.5 kWh, the respective prices being 95 centimes (1.8d.) for the gas (including all delivery charges, meter rent, &c.), and 50 centimes (0.9d.) per kWh for the electricity. The last figure has recently been contested by a correspondent who argues that 44 centimes is sufficient, taking into consideration the hours of the day when cooking is carried out in Parisian homes, as in Paris there are three tariffs for the current—night, day, and peak. He claims that the current is thus reduced in price to 15 or 16 per cent. more than for the corresponding amount of heat provided by gas. The original contributor maintains the 50 per cent., particularly as the results of several previous investigations have given the difference as varying from 0 to 100 per cent. For our own part it would appear that the prices in Paris appear to be low as compared with other large towns in France; in Bordeaux, for example, the price of gas is 81 centimes for domestic purposes and 71 centimes for industry, while for electricity the prices are 125 centimes per kWh for lighting and 75 centimes for power. Whether in Paris the difference in relative costs is 16 per cent., or even 50 per cent., electricity would appear to be favourably situated. However, apart from the relative costs, one of the main obstacles to the wide adoption of current for domestic purposes is the large number of badly constructed appliances to be found on the French market, which, although perhaps low in first cost, are unsatisfactory and disappointing in the end. Electrically heated irons have been in use in France for many years, and their use is increasing rapidly, because their construction is simple, efficient, and inexpensive. If the above figures can be maintained in practice in regard to cooking utensils, constructed as efficiently as the irons, electrical authorities should experience little difficulty in inducing consumers to adopt them in place of gas, particularly in view of the fact that the relative cost of consumption is only one factor in the comparison, others of equal importance being the cleanliness, the absence of fumes, and leaks of gas, as well as the general convenience afforded by electrical appliances, all of which are of value from an economic point of view.

Expert Witnesses.

These can hardly be described as prosperous days for electrical engineers who can rightly lay claim to the title of expert witness. Once they were very much in demand, because fundamental electrical patent cases and other matters required the special services that they were able to render. Then the electrical

industry was more or less unsteady on its legs, and the assistance of lawyers, counsel, and experts in most interesting battles before Judges of the High Courts, was required to settle patent disputes which prevented a steady forward movement being made. The lawyers, the counsel, and the expert witnesses between them drew large sums from the electrical manufacturers and other claimants to patent and other rights. In those days such litigants had no difficulty in finding expert witnesses of the first water, and who shall say that they did not earn their fees whatever they amounted to? The two parties would vie with each other in securing as early as possible the best counsel and the most distinguished technical authorities available who could be depended upon to make an effective and impressive stand before the most searching counsel or the most learned judge. If editors were called upon to assist litigants with the names of either counsel or witnesses they had little difficulty in finding them. We are not sure that their task would be quite so easy now, as professions may fail for want of practice. To-day we seem to have found a way of settling most of our difficulties without having recourse to the Courts, but we have no doubt that a number of brilliant expert witnesses would soon emerge from their embryonic stage or their seclusion were occasion for their activities to recur. We do not speak without experience when we say that when trade papers in the exercise of their duty make use of experts to assist them in the justification of their criticism, such witnesses charge substantial fees varying according to their standing, qualifications, and general usefulness to the side engaging them. But in our opinion, in such matters as this, if you want the best you must be prepared to pay for it. A County Court Judge has lately laid it down that if you desire to compel an expert witness to appear for you, you have only to serve him with a subpœna accompanied with a sum for travelling expenses, and he must appear. If he fails to do so because a special fee is not forthcoming, he makes himself liable to a fine and imprisonment for contempt of Court. This may be the law but, we, thinking of the electrical cases of the past and of others that may be yet to come, are inclined to be facetious as we contemplate electrical and other scientists, engineers, and industrial magnates, forced against their will into the witness box to swear. In short, whatever the law may say, of what use to anybody is the underpaid and reluctant expert witness? May it not even happen that he who involuntarily came to bless may remain to curse?—unintentionally, of course, despite the low position held by expert witnesses in the celebrated triple classification—liars—damned liars—and expert witnesses!

The Point Five Domestic Rate.

Our contention that the "Table of Domestic Tariffs" which we published as a special supplement to our issue of November 15th would be of interest to electricity supply authorities, has, to judge by the complimentary letters we have received and also by the requests from authorities, national and local, for copies of the inset, proved correct, and we are satisfied that the table has fulfilled a want. Our mails have also shown, as we expected and suggested, that the list was incomplete, and to-day, in our "Electricity for the Home" section, we publish particulars of a few additional "point fivers" to whom our attention has been drawn.

In one respect the "overdraft" table outshines the main "point five" list already published; it contains the particulars of what, from one viewpoint, may be described as the two most important undertakings in the total list. We refer to Hamilton and to Sale, two small undertakings with maximum demands of a little over 1,000 kW, respectively. The next undertaking in size in the list is Beckenham, with a maximum demand of 3,124 kW, which makes Sale's and Hamilton's particularly creditable achievements.

The old assertion, that what can be done by the small undertaking can be done by the large one, is not always just, but we have yet to learn why it is not so in these cases. Sale takes a bulk supply, and, of course, credit is due to the bulk suppliers for the low tariffs at which they must supply, but distribution costs are very heavy now-a-days, and the point five tariffs at both the small towns in question can only be the result of good management.

A correspondent in this issue suggests that the quotation from our editorial columns of November 1st, 1912, in our November 15th issue, is scarcely fair to those who adopt the 0.5 tariff. But our only wish is to commend the 0.5 tariff man on his courage which, it is implied, will reward him in less risks and greater stakes than are, in the first place, apparent.

The effects of the introduction of very low tariffs are cumulative and cannot be forecasted with greater accuracy than a forecast of the state of the electrical industry generally.

The Swiss Federal Railways.

The administration authorities of the Swiss Federal Railways having requested Mr. E. Huber-Stockar to draw up a report respecting the running cost of the Federal railways, the latter has placed before his committee some interesting figures.

Mr. Huber-Stockar has made a comparison between the expenses of the present electric traction and those of steam-traction in previous years, or on sections not as yet electrified. The results of his researches would seem to indicate that the saving already realised in 1929 by the use of electricity amounts to round about five million (Swiss) francs. He goes on to point out that if the price of coal were to fall 20 per cent., or if the rate of interest on the capital for electrification were to be raised to 6.38 per cent., the above-mentioned profit would be practically wiped out; but (and in this respect electricity scores) neither contingency is probable. The price of coal remains stationary, so far as Switzerland is concerned, or is on the rise, while the conversion on electrification loans, which is to take place during the coming years, will reduce to a very large extent the present rate of interest, which is actually 5.48 per cent. Should the rate of interest fall to even 5 per cent., the difference in favour of electric traction would no longer be five million francs, but 7,700,000 francs.

Another factor that is tending to encourage the promoters of the electrification programme is the fact that, in spite of the ever-increasing numbers of motor-cars and private vehicles in Switzerland, more tourists have used Swiss railways this year than ever before, and admiration of their speed, comfort, and cleanliness has been general.

The "Electrical Review" on the Bookstalls.

We have arranged that, commencing with our issue of December 6th, the Electrical Review shall be on sale at the bookstalls of Messrs. W. H. Smith and Sons at the following railway stations:—

LONDON—

Cannon Street (S.E.).
Charing Cross (S.E.) No. 1 and 3 Platforms.
King's Cross Main (G.N.) No. 2 and No. 6 Platforms.
Liverpool Street Main Platform.
London Bridge (L.B. & S.C.) and (S.E. & C.).
St. Pancras.
Victoria (C. & D.) Platform Stall.
Victoria Main.
Waterloo Main.

PROVINCIAL—

Brighton.
Liverpool (Central).
Manchester (Central) No. 3 and No. 5 Platforms.
Manchester (Victoria) No. 13 and No. 14 Platforms.
Newcastle-on-Tyne Central (West End & No. 10 Platforms).

We hope that these additional facilities will meet the convenience of readers who desire to secure their copies of the Review promptly while travelling.

The Works of Veritys, Ltd.

The business of Messrs. Veritys was originated in 1820, its products including optical apparatus and later oil lamps; to-day the company is in the forefront of the electrical industry as a manufacturer of electrical appliances and fittings for industrial and domestic service.

VERITYS, LTD., is probably one of the oldest electrical manufacturing concerns in this country. It was founded in the year 1820, by Benjamin Verity, an optician and barometer maker, and a great grandfather of George Verity, the present chairman of the company. The business gradually developed into the lighting trade, in those days by candles and oil, and was further extended when gas was introduced. Veritys later entered the electric light business, at the time when the first electric lamp was brought to the notice of an astonished world; this departure culminated in the great electrical exhibition at the Crystal Palace in 1882, when George Verity, a grandson, exhibited a huge floral fitting for which he coined the word "Electrolier." This was the beginning of a large business in ornamental electric fittings, &c., which, in turn, developed into a big trade for installing private plant in clubs, country houses, and so on.

Fig. 1.—Controller Test Room.

We have found much interest in perusing the original copy of an indenture drawn up in respect of an apprentice to Benjamin Verity in 1836. This bears examples of the curious wording of such old-time documents.

General electrical appliances followed, and this trade was carried on right up to the commencement of the Great War in 1914. During the war the works were practically taken over for Admiralty and marine service, and since then Veritys, Ltd., have specialised entirely on their own manufactures, which include a.c. and d.c. motors, dynamos, control gear, electric fans, and industrial fittings.

During a recent tour of the extensive works at Aston, Birmingham, we were impressed by a large open side planer at work. This machine, fig. 4, has a 15-ft. stroke and is capable of dealing with large jobs quickly and accurately. In the same shop a battery of low-swing lathes was seen at work making dynamo and motor spindles. After leaving these machines all the shafts are pressed on to the grinding machines, where they are accurately ground to size. A special feature in the machine shop is the very large battery of automatics which deal with motor and dynamo brackets and yokes of smaller machines. This battery, fig. 7, is capable of turning out an enormous amount of work, and for some months past has been kept running continuously night and day. The shop is equipped on the most modern lines for speedy and accurate production, and the very latest tools are employed in the various other processes. Fig. 14 is a close-up view of a large automatic machine. This machine is capable of turning out end brackets for up to 40-h.p. motors at the rate of 50 per day.

Fig. 2.—The Radiator Shop.

A visit was next paid to the core

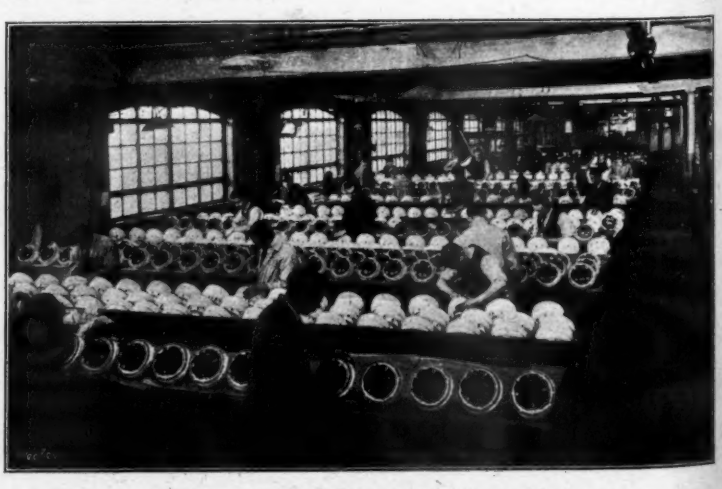


Fig. 3.—Ceiling Fans being Assembled.

and commutator building department, where the construction of these parts was watched; these range from the smallest to the largest size. In the winding department a large number of men, women, and girls are employed in winding a most varied class of work. All rotors and armatures are dynamically balanced, and very delicate machines are engaged on this work. A view of one of the balancing machines is given in fig. 15. Fig. 8 is an interesting picture taken in the winding shop, showing, during winding, the stators of three 200-h.p. induction motors. Two large impregnating plants are kept busy treating the windings, which are first stoved at 200 deg. F. for 24 hours to remove all moisture, and then they are placed in vacuum tanks, and whilst under vacuum insulating varnish is allowed to flow in, completely submerging the contents of the tanks, thus ensuring that the varnish gets to the innermost parts of the windings. After this treatment they are again taken to the drying stoves and baked at a temperature of 200 deg. F. for 24 hours or more, according to the size of the armature or rotor. We next visited the completely equipped motor test room. One section of this is devoted to a.c. machines, and one section to d.c. A batch of 12½-in. motor-driven blowers, fig. 9, for the British Admiralty was seen on test, and also a large range of many other types of machines. All the motors and dynamos produced are given six hours' run on full load, then 25 per cent. overload for half-an-hour, and finally 100 per cent. overload momentarily. After test they are flashed, when hot, at double the working voltage plus 1,000 volts, in accordance with the tests laid down by the British Engineering Standards Association. It is possible in this test room to deal with up to 50 or 60 machines on load at one time. Adjoining the test bed is the small motor-assembly shop, fig. 6. This shop has recently been modernised and every facility for quick and clean assembling of ball-bearing machines has been provided.

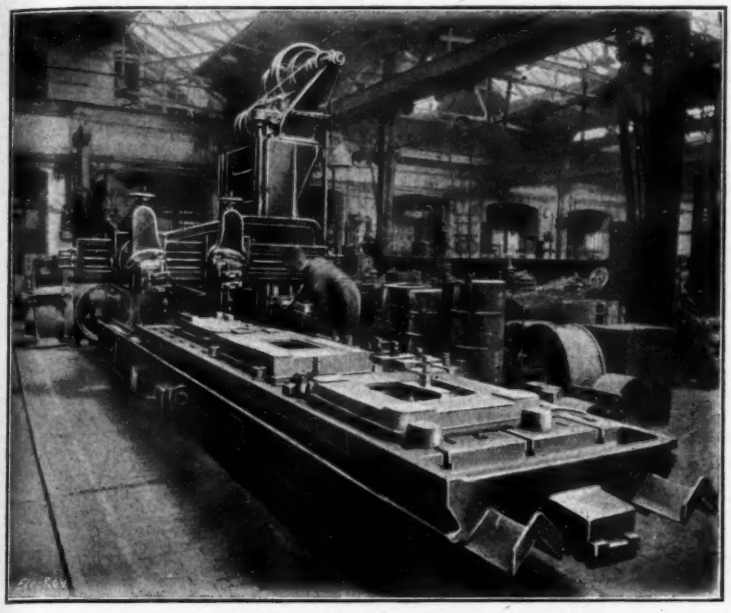


Fig. 4.—Open Side Planer; 15-ft. Stroke.

One of the most particular branches of the company's business is that dealing with the manufacture of fans, which is on a very large scale. A very complete range of fans is made, suitable for ordinary commercial use and also for use on ships and in the tropics. The range practically covers the smallest type of desk fan to the large ceiling fans with blades of 56-in. and 60-in. sweep. Fig. 3 shows a batch of ceiling fans being assembled. It was interesting to note the hundreds of the company's well-known "Orbit" fans being tested, a large number of which were for the British Admiralty, and the operation of so many of these fans all together is a somewhat curious sight. Special attention is being given by Veritys at present to

Fig. 5.—Controller Assembly Shop.

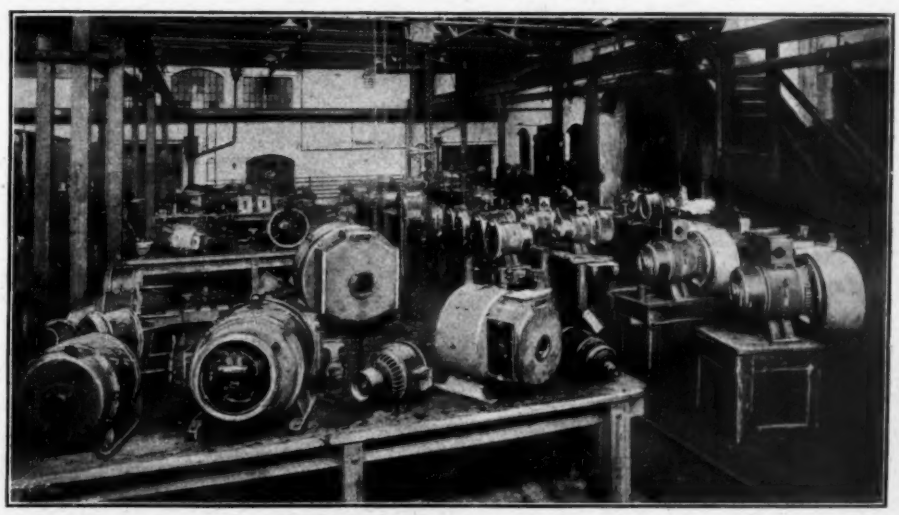


Fig. 6.—Motor-Assembly Shop.

the design of what are known as "high efficiency" fans. The machine shop of the controller department is equipped with all the necessary up-to-date machinery and tools for the mass production of competent parts of switch and control gear. The main section of the controller shop, fig. 5, is devoted to the assembly of innumerable types of control apparatus for a.c. and d.c. motors and generators of medium and large capacity. The control apparatus produced comprises main switchboards of the open type and ironclad unit types, ironclad distribution boards, face-plate starters, complete starting panels, face-plate and drum type, circuit breakers, contactors, automatic solenoid starters, crane controllers and panels, shunt and series regulators, and oil-immersed switches and starters, both in separate units and in panel form. The company also specialises in robust control gear for marine use. Many unique features are incorporated in the apparatus to ensure correct and foolproof operation, and special mention may be made of the d.c. drum panels, with ratchet operation and timing devices to ensure smooth acceleration in starting up, also the rotor and stator starter with special interlocks for correct sequence in starting.

Fig. 7.—A Battery of Automatic Machines.

Fig. 8.—Large Stators in Winding Shop.

All control apparatus is subject to searching tests before leaving the shops. Tests for temperature, resistance, and also insulation and flash tests are taken, after which a general inspection of the apparatus is carried out. Fig 1 is a view in the controller test room.

An auxiliary section of the controller department is devoted to the assembly of air-break and oil-immersed starters for the control of the smaller motors. To ensure interchangeability, all parts are assembled in special jigs. The V.H.C. starter, fig. 13, is used in connection with the high-torque Verity-Heemaf motor for limiting the current rush on any notch of the controller to a figure which is considerably below full-load current. Reference to the diagram, fig. 11, will give an idea of the characteristic of a 40-b.h.p. V.H. motor when used with this type of starter. It will be seen that the opposing torque at starting is 50 per cent. of full-load torque. The controller has five positions or notches, as well as the "off" position. On the first notch the current rush is approximately 50 per cent.; on the second 40 per cent.; and on the third 70 per cent.; thus giving a total of 160 per cent. of full-load current, but in three distinct stages. With the controller in this position, *i.e.*, on the third notch, and not until then, the motor starts with a torque of approximately 80 per cent. of full-load torque.

Owing to the great accelerating torque, as compared with the opposing torque, *i.e.*, 80 per cent. against 50 per cent., the motor will now quickly speed up until the opposing torque and developed torque are equal at approximately 83 per cent. of full-load speed, when the motor ceases to accelerate; the current in the meantime has decreased from 160 per cent. to approximately 90 per cent. After switching on to the fourth notch the current increases from 90 per cent. to approximately 175 per cent. (or a rush of 85 per cent. f.l.c.),

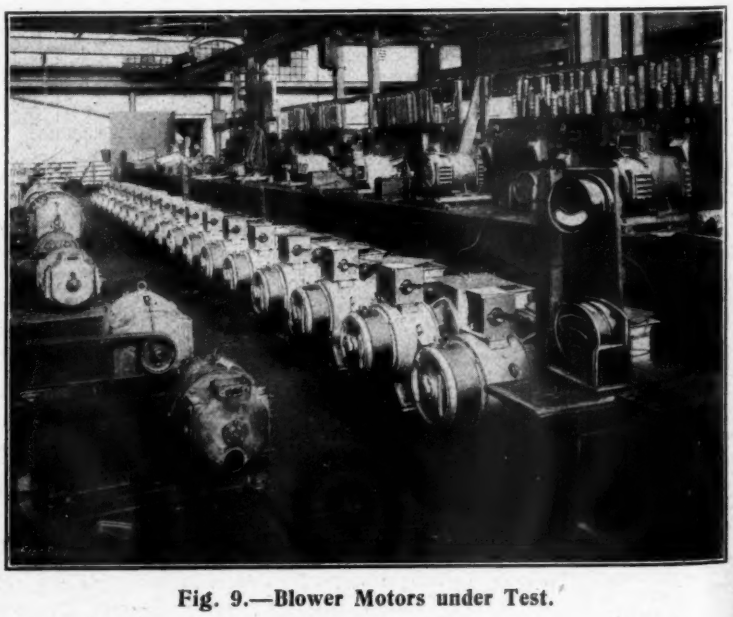


Fig. 9.—Blower Motors under Test.

and the corresponding torque to about 95 per cent. f.l.t. The motor further accelerates until the motor and opposing torques are again equal. Now and finally when switched on to the fifth notch the current reaches the peak of just over 200 per cent. of f.l.c. The accelerating torque is more than twice as high as the opposing torque, and the motor rapidly attains full speed. The current peak on the final notch quickly falls to normal full-load current. It will be seen that no rush of current on any notch reaches anything like f.l.c., consequently the V.H. motor, when

Fig. 10.—Commercial Fitting with Under-Lip Gallery.

used in conjunction with the V.H.C. controller, complies in every way with supply companies' requirements with regard to current rushes.

A visit was also paid to a separate factory which deals with press work in connection with the company's manu-

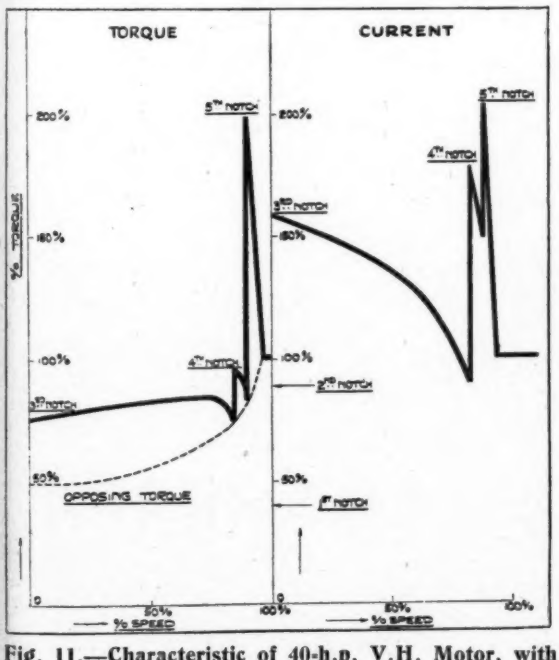


Fig. 11.—Characteristic of 40-h.p. V.H. Motor, with V.H.C. Starter.

factures. A large number of hand and power presses are used. The company employs laminated poles for all its d.c. machines; combination tools are used for stamping out a.c. and d.c. armatures, rotor and stator disks, thus ensuring very accurate slots.

This factory also deals with the manufacture of all small parts, such as screws and the numerous hundred-and-one parts which are used in the manufacture of such a large range of electrical apparatus.

The "Maxlume" section of the works is devoted entirely to the manufacture of industrial reflectors,

Fig. 12.—The "Compton" Fire.

street-lighting, ship, train, and general commercial lighting equipment and electric radiators. A large shop, fig. 2, is engaged in making radiators, and a special feature of interest is that they are built up of aluminium-alloy. This has several advantages over cast-iron on account of weight. Many of the better-class fires, which

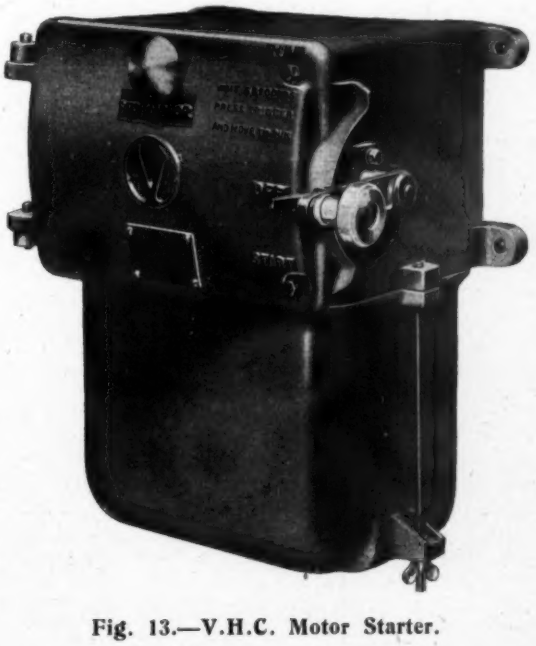


Fig. 13.—V.H.C. Motor Starter.

are designed large enough to conceal the ordinary fireplace, if made in iron, can hardly be lifted; if made in aluminium they immediately become portable.

Fig. 12 shows the 3-bar "Compton" fire. It has a loading of 3,000 watts, and two switches provide 3 deg.

of heat. It is a handsome apparatus, designed with Jacobean enrichments, for portable use, and large enough to conceal the usual fireplace opening. It stands high on the hearth, is strong, but very light, in contrast to the usual heavy cast-iron fires. The highly polished copper reflector throws forward the heat from the top

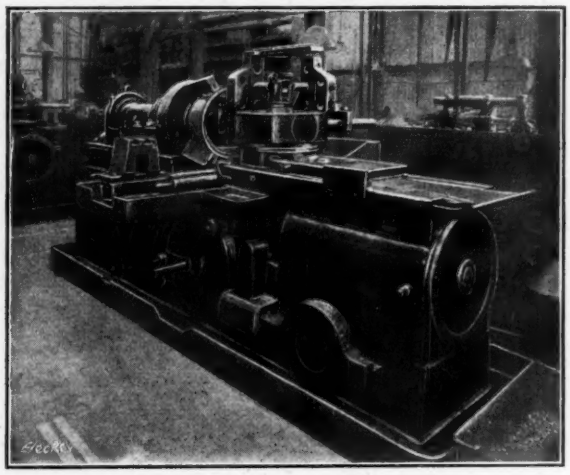
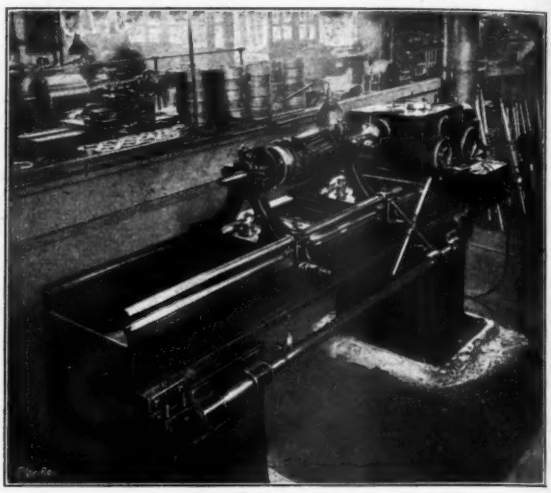


Fig. 14.—Large Automatic Machine.

heating bar most efficiently, and the effect of the glow in the reflector is very attractive.

A very interesting lighting fitting just marketed by the company is the new patent under-lip gallery, designed for the support of heavy and large glass fittings to take large wattage lamps. It will be noticed from the illustration, fig. 10, that the glass is held underneath the lip instead of in the groove; this ensures a safety grip for the heavy glass and has met with much success. "Maxlume" industrial reflectors are designed to meet



Fg. 15.—Dynamic Balancing Machine.

almost any factory lighting conditions. The Home Office type, having 20 deg. cut-off to avoid glare, the recommendation of the Home Office Committee, was one of the first reflectors embodying this feature to be marketed.

An Auto-Condenser.

A compact arrangement that is capable of affording a large number of combinations and, at the same time, effecting a considerable saving of material.

By A. MORTIMER CODD, F.Ph.S.

WHEN using auto-transformers the author has frequently wondered whether it would be possible to effect the same facility in tapping with its complementary apparatus the condenser, by inserting here and there one or more additional foils.

At first the idea seemed fantastic, but a few experiments soon showed that it worked perfectly in practice and was susceptible to simple theoretical laws in explanation. Fig. 1 depicts an ordinary simple condenser, the small diagrams above showing the theoretical con-

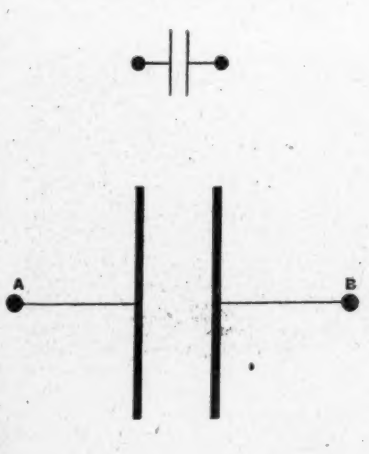


Fig. 1.

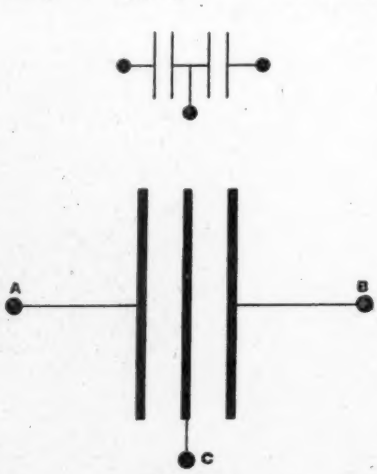


Fig. 2.

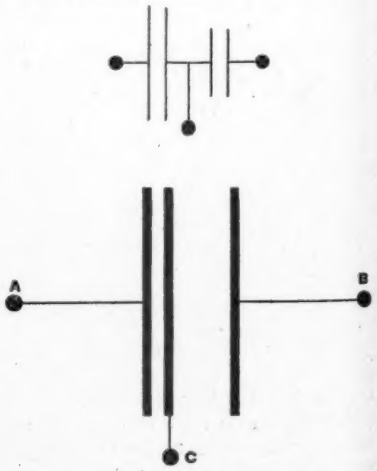


Fig. 4.

ditions within. There are two plates, armatures, or foils, separated by a dielectric, which may be a gas (such as air), a solid (such as mica, paper, or glass), or a liquid (such as oil, or liquid of the electrolytic variety). The constitution of the dielectric does not affect the con-

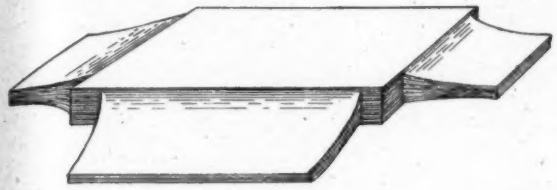


Fig. 3.

siderations under review. It is sufficient to remember that if an alternating pressure be applied to the two main plates A and B a current will flow in and out of those plates, straining the dielectric between them.

Suppose now that a third plate C is made to slide in between A and B centrally as indicated in fig. 2, virtually forming two condensers in series. For clearness it is proposed to call the additional plate, or plates, "interplates." The general arrangement of such an auto-condenser, of paper and foil, is sketched in fig. 3, in which A and B are the main plates and C is the interplate. If a pressure is now applied between A and B, it is possible to tap off from AC or BC a pressure equal to half the main voltage; that is, the pressure between AC is equal to that from CB, because the disposition of the plates with respect to the dielectric is symmetrical. It is possible that, if the terminals A, B and C were connected to a 3-phase circuit, interesting oscillographic records would be obtained.

Now let us further suppose that we move plate C away from the centre, so that it is, say, one-third distant from A and two-thirds distant from B, as indicated in fig. 4. By decentralising the interplate we can bias the dielectric, so that pressures proportional to the thickness of the dielectric will be given off. Thus, if 100 volts is applied between A and B, the pressure between AC will be 33 volts and that between CB 66 volts. Further, if a current of one ampere is surging between A and B, a current of nearly one ampere can be drawn between C and B, proportionally less being given from A and C. It will be realised that, although any current and voltage can be drawn off from the auto-condenser, the current and voltage cannot exceed those of the main circuit; in other words, the device does not in this respect behave as an auto-transformer by stepping up. Further, the current pulsating between A and B is limited by the capacity of the smallest condenser (if any) of the series.

It will be noticed that in the preceding examples (figs. 2 and 4), although we can tap off a voltage either from C to A, or from C to B, we may not be able to use both tappings without risk of partially short circuiting A and B. That risk can, however, be avoided by the use of a second interplate D (fig. 5), but the latter cannot be as large as C, since it would shield it from electrostatic influence; it is, therefore, necessary to effect the design by what amounts to cutting C in half to form both C and D.

We shall now find that the pressures between DA, DB, CA, and CB are all equal, and of half the value of that obtaining between A and B; thus, if the pressure between A and B is as before 100 volts, 50-volt lamps can be connected between AD and CB independently; C and D need not necessarily be equal, but may be any fractions circumstances may dictate. Their area does not affect the pressure, but only the current output, which is proportional to the area.

If now we bias the dielectric for both the interplates, as we have already done in fig. 4, we carry the disposition of the auto-condenser a step forward, as shown in fig. 6. In this case the pressure between AD and AC will be one-third of that between A and B, while that between BC and BD will be two-thirds. As the interplates C and D are free, we can draw pressures of, say, 33 volts from AD and 66 volts from BC, if the voltage of AB is maintained at 100 volts.

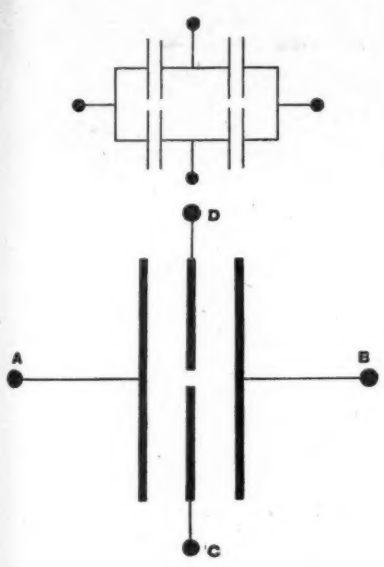


Fig. 5.

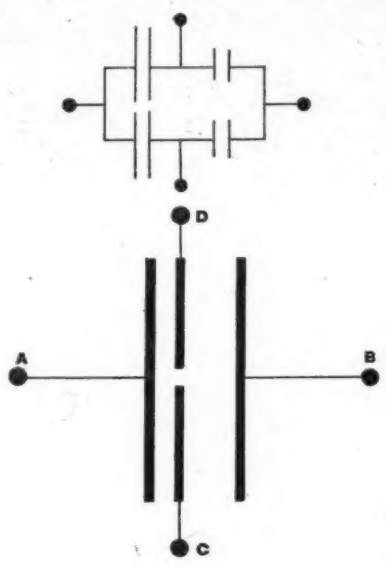


Fig. 6.

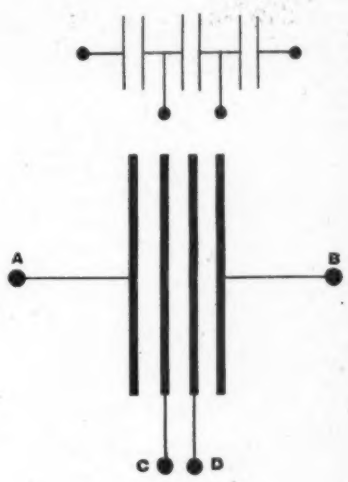
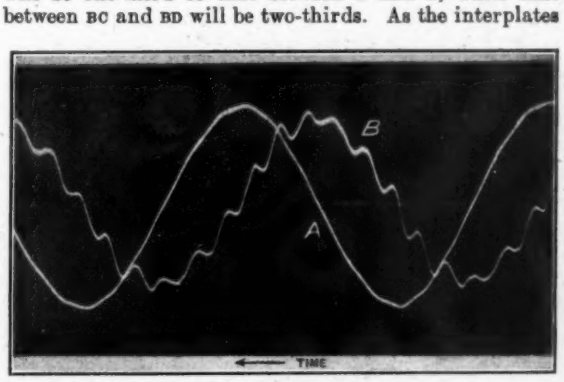


Fig. 7.



A=voltage; B=current.
No load condition.

Fig. 8.

Fig. 7 carries the arrangement another step in advance. Instead of using one interplate, two or more

interplates (CD) can be arranged, the effect of which is to place the interplates as condensers in series.

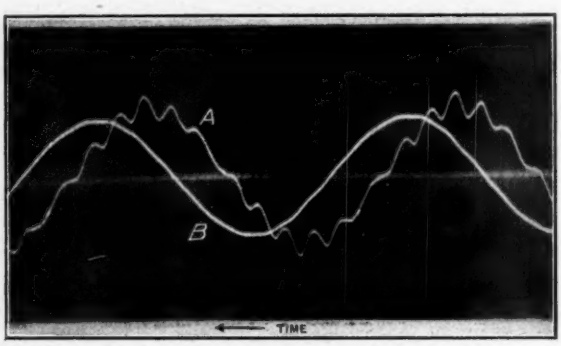
It may be asked wherein is the auto-condenser better than an arrangement of ordinary condensers in series or parallel? The reply is that the auto-condenser is a compact unit able to afford a large number of combinations, if desired, and at the same time effecting a considerable saving in material.

Some, viewing for the first time the unfamiliar arrangement of the auto-condenser, may question how it is possible to draw off current and voltage without apparently increasing the external source of supply. This is, of course, a fallacy.

Turning again to fig. 2, if the capacity between A and B be unity, regarding the arrangement as a simple condenser, then the capacity between C and A, or C and B, will be twice unity and that between C and AB connected four times unity. Now, suppose a current to be flowing in and out of the condenser between A and B, and a load to be applied between, say, C and B. Let the load be increased until C and B are virtually short circuited, then the arrangement becomes a simple condenser with plates A and C, but a condenser of twice the capacity of A and B and, therefore, capable of passing twice the current. That is the reason why in fig. 4 a greater current can be drawn from CB than from AC.

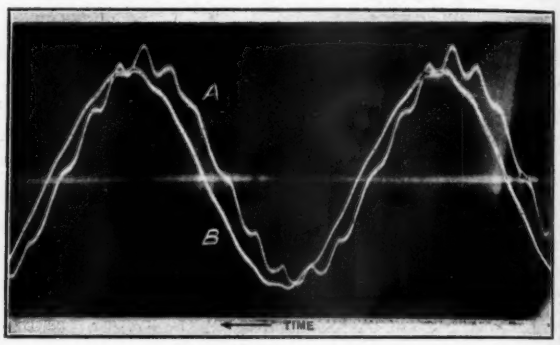
Fig. 8 shows the main current flowing in the condenser and the voltage over the interplate C. It will be noticed that current and voltage are nearly out of phase, the slight difference being due, no doubt, to the current taken by the voltage strip of the oscillograph. Fig. 9 shows the currents both in the main circuit and in the interplate on light load, while fig. 10 shows the same thing with a heavier load in the interplate. It will be noticed that not only is the magnitude of the current loops increased, but that they also appear to be coming more into step.

Various combinations of the auto-condenser indicated could be multiplied to tedious length, but I think the above examples will suffice to illustrate the principle. For example, fig. 2 could be used in a filter, or smoothing circuit, and figs. 5 and 6 to work independently lamps, loud-speakers, or other loads of widely different voltage. The arrangement shown in fig. 7 is convenient for lowering the voltage of a high-pressure circuit, so that the reading of a relatively low-voltage instrument tapped off can be calibrated in high-voltage figures. The area of the interplates can be relatively small if an electrostatic instrument is used, provided the area of the interplates bear some relation to that of the moving vanes. With this arrangement also in a h.f. or diathermic circuit C and D might be the patient terminals. Being earth-free, there would be no danger of the patient being placed in metallic connection with a conductor at high potential. Doubtless many other uses and combinations will occur to the reader in his specialised branch of electrical application.



A=mains current.
B=interplate current.
Light load condition.

Fig. 9.



A=mains current.
B=intermediate current.
Heavier load condition.

Fig. 10.

Automatic Combustion Control.

Some Features of the System Adopted at the Edgar Generating Station, Boston, U.S.A.

By C. H. S. TUPHOLME.

AN interesting example of the application of automatic combustion control as applied to high-pressure boilers is to be found at the Edgar generating station, Boston, of the Edison Electric Illuminating Co. The boiler plant in this case comprises three working at 375 lb. and five at 1,300 lb. pressure per sq. in. A complete automatic combustion control equipment has been installed by the Bailey Meter Co. The boilers are fitted with underfeed-stokers, driven by electric motors, the speeds of which are controlled by shifting the brushes as indicated in the diagram. All the boilers are equipped with both forced- and induced-draught fans.

Each of the last four high-pressure boilers, Nos. 5, 6, 7, and 8, has two induced-draught and two forced-draught fans. The two fans in each case are coupled together, with a small motor for low ratings connected to one end of the fan shaft, and a larger motor for high ratings connected to the other end.

On boilers Nos. 5 and 6 the forced-draught fans employ 125-h.p. and 300-h.p. motors for the low and high ratings, respectively, and the induced-draught fans have 200-h.p. and 450-h.p. motors. The control equipment has been designed to operate the fan motor drum controllers and also to throttle the dampers on the inlet side of the fans in order to obtain ratings below those possible with the small fan motors running at the minimum speed. In order to operate the inlet dampers and the two drum controllers in the proper sequence, two pairs of intermittent gears are used as shown in the diagram.

In the case of the forced-draught fans, for instance,

when the damper is opening from the closed position to approximately 50 deg., both the intermittent pinions driving the drum controllers will be sliding on the intermittent driving gears. At 50 deg. damper opening, the intermittent pinion driving the 31-point controller for the 125-h.p. forced-draught fan motor is picked up and driven to the maximum drum controller position, at which time it again slides. The intermittent pinion on the 29-point drum controller for the 300-h.p. motor is picked up when the controller for the small motor is on its 29th step, and it is gradually advanced from this

The control drives are designed so that the rates of supply of air and fuel are varied in substantially the correct proportion. The slight readjustments necessary in the fuel supply to maintain the correct fuel-air ratio are made automatically by the steam-flow and air-flow contactor, while the air supplied to the fuel bed by forced draught is governed by the furnace draught. In this way all three conditions for proper operation are satisfied.

The control drives used to regulate the induced and forced draught at the Edgar station each contain a pair

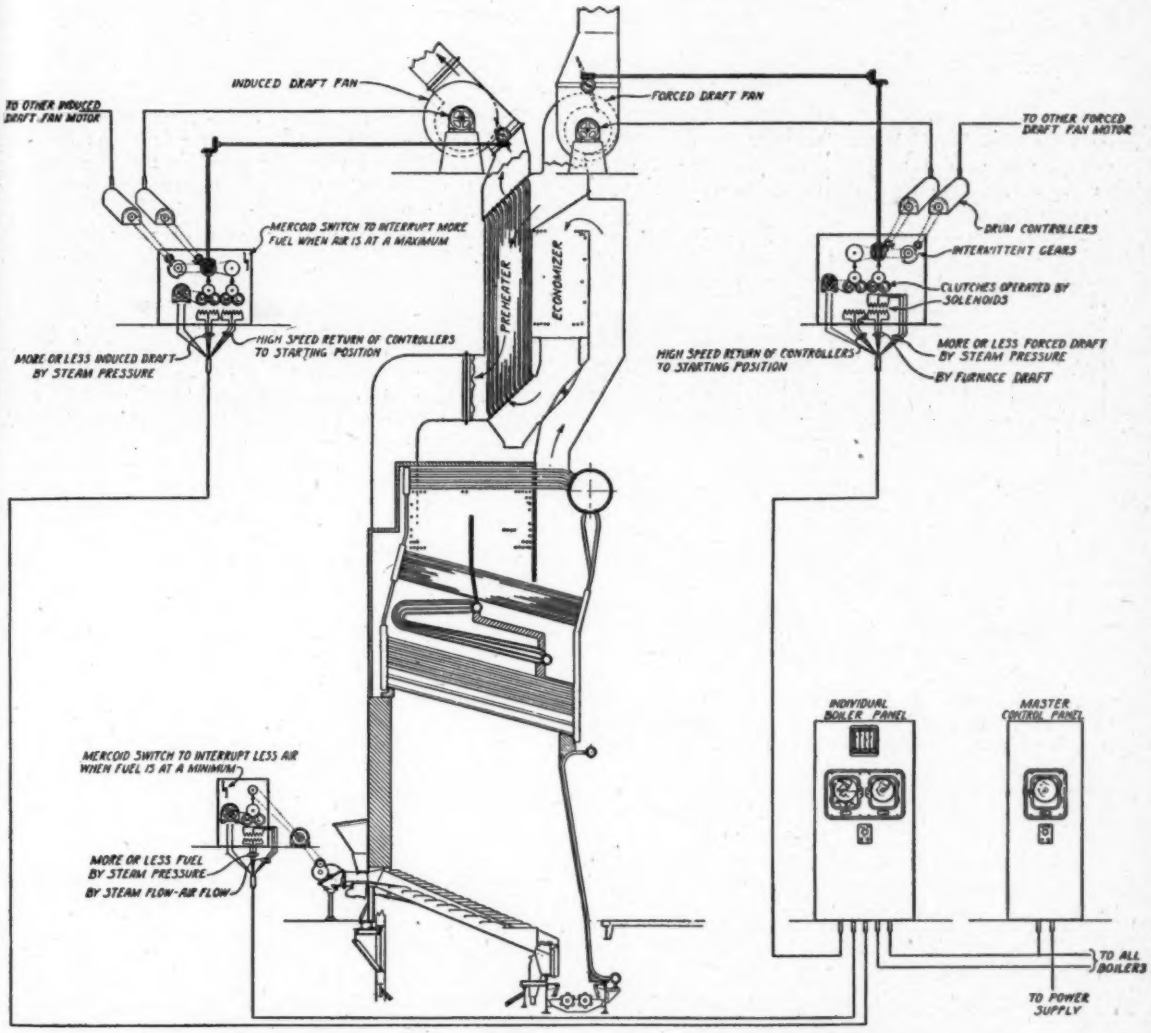

INDUCED DRAFT FAN
TO OTHER INDUCED DRAFT FAN MOTOR
FORCED DRAFT FAN
TO OTHER FORCED DRAFT FAN MOTOR
MERCOID SWITCH TO INTERRUPT MORE FUEL WHEN AIR IS AT A MAXIMUM
PREHEATER
ECONOMIZER
DRUM CONTROLLERS
INTERMITTENT GEARS
CLUTCHES OPERATED BY SOLENOIDS
HIGH SPEED RETURN OF CONTROLLERS TO STARTING POSITION
MORE OR LESS INDUCED DRAFT BY STEAM PRESSURE
HIGH SPEED RETURN OF CONTROLLERS TO STARTING POSITION
MORE OR LESS FORCED DRAFT BY STEAM PRESSURE
BY FURNACE DRAFT
INDIVIDUAL BOILER PANEL
MASTER CONTROL PANEL
MERCOID SWITCH TO INTERRUPT LESS AIR WHEN FUEL IS AT A MINIMUM
MORE OR LESS FUEL BY STEAM PRESSURE
BY STEAM FLOW-AIR FLOW
TO ALL BOILERS
TO POWER SUPPLY

Fig. 1.—Diagram of the Control System of the Boiler-house Plant.

position until the maximum fan speed is obtained and the damper is wide open. The induced draught for boilers Nos. 5 and 6 is controlled in a similar manner.

The second extension at the Edgar station consists of two high-pressure boilers. Nos. 7 and 8, which are similar to Nos. 5 and 6, comprising the first extension, with the exception that they are equipped with Sturtevant fans with inlet vane control, and each pair of the two induced and two forced-draught fans is driven by two single-speed motors. The control of the inlet vanes and the automatic changing of the fan speed is determined by the rating on the boiler.

The Bailey meter control system in this plant changes the supply of fuel and air to all boilers simultaneously in response to changes in the steam pressure. When the load on the station increases the steam pressure starts to drop and the master steam pressure contactor makes contact to increase the speed of the stokers, forced-draught fans, and induced-draught fans on all boilers connected to the control system, distributing the load change equally among the various boilers.

of high-speed clutches to permit of the automatic return of the drum controllers to their starting position after a power failure, and to close quickly or open the inlet vanes on boilers Nos. 7 and 8 when decreasing or increasing the fan speed.

The writer is indebted to the Bailey Meter Co. for the diagram of the connections at the Edgar station reproduced above.

Essay Competition.

The *Journal of Careers* for November contains particulars of a Prize Essay Competition for boys of from 16 to 19 years of age. It is organised in conjunction with the Economic League and offers a first prize of £100, and a number of others for £25 and £5 each for an essay on "What I want to be and why." Entries have to be sent in on a special form by December 21st.

Our Overseas Electrical Markets.

Economic Conditions in Australia, New Zealand, South Africa and India.

WE give below our usual quarterly survey of economic conditions in Great Britain's best overseas markets for electrical goods, *viz.*, India, Australia, New Zealand, and South Africa, together with charts showing the trend in recent months of imports of such goods into those countries.

Australia.

The outlook in Australia is not too promising, but it need not be assumed that the defeat of Mr. Bruce and

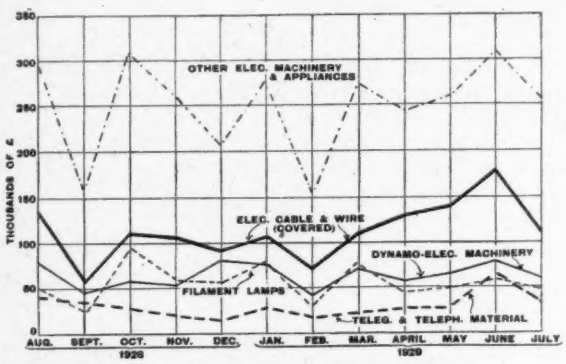


Fig. 1.—Australian Electrical Imports.

his Government will adversely affect the business situation. It may well happen that the succession to power of Mr. Scullin and his followers will not be accompanied by any ultra-socialistic legislation.

The principal factor which has resulted in a check to trade during the past quarter has been the uncertainty regarding harvest prospects, owing to the insufficiency of rain. The drought in a number of areas, notably in parts of New South Wales, was felt well into September, despite a certain amount of rain in August. Later, however, a satisfactory fall occurred not only in New South Wales but also in South Australia, Victoria and Queensland, with the result that the wheat outlook was improved. In Western Australia prospects are expected to compensate to some extent for indifferent crops in other States, but the wheat yield does not seem likely to be above the normal.

While the wool clip is large, disappointment is felt regarding the depression in prices. On the other hand, a large butter and fruit production is confidently expected. The opinion is, however, expressed in banking circles that the adverse seasonal outlook is being partly offset by improved business organisation and general economies.

Another depressing factor has been the disputes in the coal and timber trades. These affected general business adversely, and as a result unemployment increased in many industries while wholesalers and retailers found difficulty in clearing their stocks. The motor vehicle market, particularly commercial cars, grew dull; it is not anticipated that the trade in light passenger cars and trucks will remain quiet for long. There is an impression in banking circles that imports of general merchandise will suffer restriction.

With regard to the electrical trade, whereas the demand for industrial motors and other electrical apparatus of the heavier type continues to be slow, an increasing business in household electrical goods is developing. A large share of the last-named is being obtained by Canadian manufacturers.

For the fiscal year ended June 30th last, there was a small favourable trade balance totalling £1,150,000, comparing with an unfavourable balance of £4,730,000 twelve months before. For the Michaelmas quarter the Customs revenue totalled £11,522,000, being £584,000 above the estimates. During the twelve months ended June last Australia's imports of electrical machinery and appliances totalled £6,132,000 in value as compared with £7,127,900 during the previous twelve months.

On the general economic position of the Commonwealth, Sir Ernest Clark, a member of the British Economic Mission, made some interesting remarks recently. He said that the final conclusion of the Mission was that Australia's creditors had no cause for present anxiety because she was still borrowing well within her actual potential resources; but they were of opinion that she had not, in past years, borrowed wisely, and that she had pledged to too great an extent those future resources, and mortgaged too deeply that future prosperity upon which she could reasonably reckon, thus throwing the burden of her borrowings upon future generations who would have their own needs to meet. He pointed out that one half of Australia's debt was owed to her own people, and she was in the position of being able to pay more than half her debt from her assets.

New Zealand.

During the past quarter business conditions on the whole have shown favourable tendencies. Production has been on a satisfactory level, and although prices of wool have been weak those for meat products have improved.

Seasonal quietude in trade has been rather less pronounced this year than it was twelve months ago. There has recently been an improved demand for motor cars and accessories, builders' hardware and electrical goods.

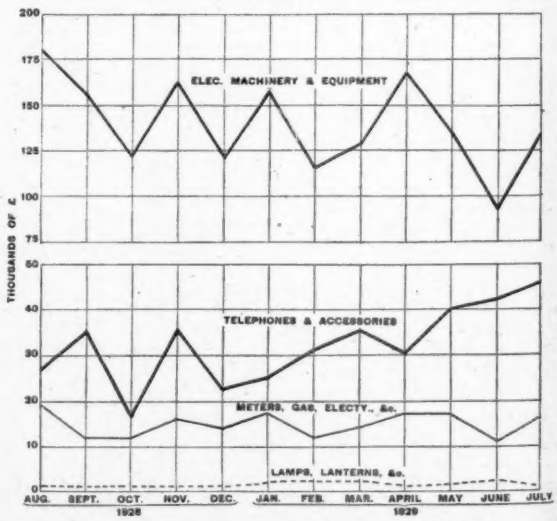


Fig. 2.—New Zealand's Electrical Imports.

The Government is dealing in a systematic manner with the unemployment problem, which, although not very serious, has been giving rise to some anxiety. Steps are being taken to encourage and expedite land settlement and to organise a public works programme. The Prime Minister takes an optimistic view of the labour situation, and at the end of September declared that a few weeks would see a solution, inasmuch as all the unem-

ployed would be absorbed. Occupation has been found on forestry operations, road construction and similar work.

Good crops are forecast in most parts of the Dominion as a result of the favourable weather, and the prospects for a good dairy season are considered encouraging.

New Zealand's import figures for September were the highest for seven years.

South Africa.

While few important changes have taken place in South African commercial conditions during the past quarter, there have been signs of slackening business. The engineering trades in Johannesburg and manufacturing industries in Cape Town have been quiet. In boot and shoe making, activity has been rather below normal, which has some significance in a branch which generally reflects the purchasing power of the community as a whole. Business in mining material and machinery has been up to the average.

Thus far during the financial year (*i.e.*, since April 1st) railway earnings have been below both estimates and the figure for the corresponding period of the previous year. With regard to foreign trade, exports from January to September show a decline in value of about £3,000,000, and imports an increase of nearly the same amount. Gold production for the eight months was £400,000 up on the year. The diamond market

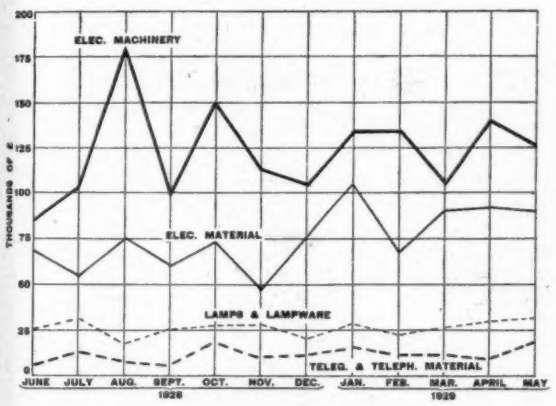


Fig. 3.—South African Electrical Imports.

appears to have been affected by the prospect of a revision in the American duty on precious stones. Coal output has increased in Natal, but decreased in the Transvaal; the changes, however, are only slight.

On the other hand, the agricultural outlook is promising. Rain has been abundant in the Cape Province, and the forecasts for fruit, wheat and oats are excellent. Fruit exports have continued their increase. Grain prices have receded in accordance with the world trend. The decline in wool is expected to be balanced, so far as South Africa is concerned, by an improvement in the quantity and quality of the clip.

There is a feeling that financial conditions are tending towards a restriction before long of purchases of railway and other constructional and engineering material. After five years of practically unbroken prosperity, it would not be surprising if something in the nature of a setback occurred.

India.

It is to be feared that British electrical manufacturers have little reason for encouragement from the announcement of the agreement between Messrs. Tata & Sons, Ltd., and an American syndicate, with respect to the management of the Tata hydro-electric companies.

According to a statement made by a director of the Tata concern, the syndicate in question, which is the American and Foreign Power Co., Inc., will possibly help Bombay's hydro-electric industry by giving it financial assistance. It will probably adjust the finances of the Bombay undertaking, in order to reduce the interest charges. Whether or not the shareholders of the Bombay Electric Supply & Tramways Co., Ltd., would sell their company was, he said, another matter. The Americans may finance fresh schemes of development. On the other hand, it is satisfactory to find that in Madras, orders for rolling stock for the suburban electric services have been placed in Great Britain.

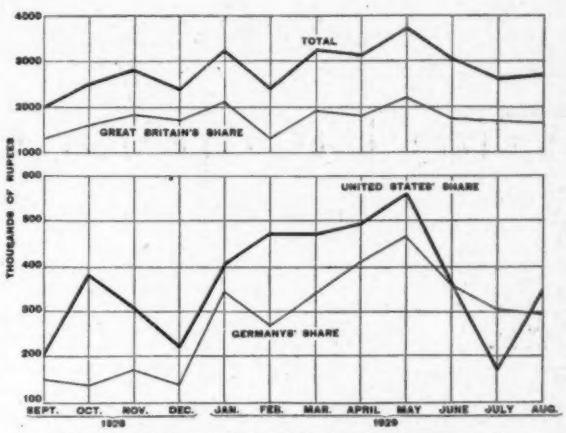


Fig. 4.—Indian Electrical Apparatus Imports.

An interesting account of the progress of the Pykara hydro-electric scheme is contained in the recently issued report for 1928 of the Madras Hydro-Electric Department. The surveys made included the power house site and part of the transmission lines, &c., and detailed designs and estimates were prepared. As a result of recommendations by Messrs. Merz & Partners, additions were made to the proposed installation equipment. Conferences with the consulting electrical engineers to the South Indian Railway (Messrs. Robt. White and Partners) were also held on the subject of the best means of electrifying certain sections of that railway, and work on the Trichinopoly-Madura, Dindigul-Olavakkot-Shoranur-Podanur-Mettupalayan-Erode and Nilgiri Railway was recommended.

It was decided to undertake the construction of the Glen Morgan project, in order that a start could be made on the electrical development of the Nilgiris, and a source of power for construction purposes be made

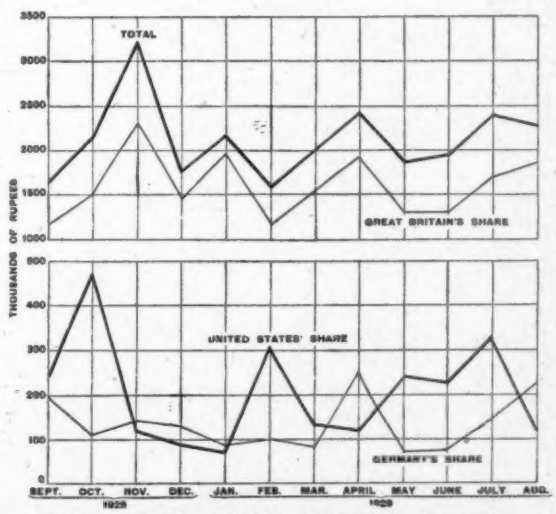


Fig. 5.—Indian Electrical Machinery Imports.

available as soon as the main Pykara scheme might be sanctioned. Orders were placed, the time for starting up being September this year.

With regard to work that is proposed to be done during the coming year, at Pykara, transmission line surveys and specifications will be completed, and construction work will be initiated; at Mettur, plans and estimates will be prepared for a power house at the dam

and a transmission line to Madras. In addition, investigations into the possibility of generating power from canals near Bezwada will be continued. Speaking at the recent opening of the electrified section from Kalyan to Poona of the Great India Peninsula Railway, Sir Frederick Sykes said that the G.I.P.'s step in main line electrification placed India ahead of England in that field. After referring to the economic advantages of electrification in higher efficiency and saving in costs, the Governor said the real significance of the improved service was that Bombay, as the gateway of India, had to distribute an immense transit traffic to all India, and the electrification of this and the line to Igatpuri would accelerate the process.

The European Glow-lamp Cartel.

The Expiration of the Patents in 1933—1935.

(COMMUNICATED.)

As a number of the main patents protecting the glow-lamp industry will expire between 1933 and 1935, the question has arisen whether there will then be any chance for non-syndicated manufacturers. The lapse of the patents is said to afford an explanation for the pressure exercised by American interests for an inter-connection with the European lamp industry. Under the circumstances special interest is attached to the present situation of most makers in Europe as embodied in the European Glow-lamp Cartel. The question has recently been raised in the Amsterdam *Telegraaf* and in *Die Wirtschaftskurve*.

At the outset it is pointed out that the first place in the production of glow lamps throughout the world is occupied by the United States with from 45 to 50 per cent. of the aggregate figures. The estimates for Germany are from 15 to 20 per cent.; those for Holland from 8 to 9 per cent.; those for England from 7 to 8 per cent.; and those for Japan and Russia from 4 to 5 per cent. in each case. On the other hand, the export figures for the different countries vary considerably and range, it is claimed, from as low as 2½ per cent. of the production in the United States, to as high as 60 per cent. of the output in Holland, so that the latter is the greatest export country in the world. In this connection it is mentioned that since 1926 Holland has discontinued exports of lamps to the United States, and the same observation applies to German exports to America since the close of 1928. Obviously these events are ascribed to mutual agreements with the United States General Electric Company in the matter of the division of markets.

After the German Osram Company the Dutch Philips company is the largest concern in the European Glow-lamp Cartel. During the course of the present year the position of the cartel has been materially strengthened by various events. The Philips company has extended its interests in Belgium and Poland; Philips and Osram have enlarged their participations in the Italian industry; and a further extension has taken place in France, where the Compagnie des Lampes acquired two smaller undertakings, and also in Sweden.

The consolidation of the world industry which has taken place through the strengthening of the position of the American General Electric Company in the European glow-lamp industry is important. The company proportionately increased its former holding in the Philips company in connection with its augmentation of capital, acquired 16⅔ per cent. of the capital in the German Osram company, and entered into closer relations with the Ver. Gluhlampen und Elektricitäts A.G., of Ujpest. Recently, however, rumours have been in circulation on the Amsterdam Bourse that the American General Electric Company has disposed of its holding of shares in the Philips company, while the latter has sold its shares in the American company, so that no mutual interests now exist.

A number of lampmakers are active outside the scope of the cartel. The Allgemeine Gluhlampenfabrik A.G., of Vienna, has carried on a protracted patent action against the cartel. In Sweden the Kooperativa Forbund is conducting an active anti-cartel propaganda, and its factory is to start production in Stockholm late next summer, with an annual production of between two and three million lamps as a beginning, the factory now being in course of erection at the Hammarbyleden. In Holland the efforts of the Splendor Gloeilampenfabrieken seem to have successfully secured an independent existence. However, it is understood that an arrangement has been entered into between the latter and the Philips company under which in some way or other the past keen competition will be avoided and be replaced by co-operation.

Besides the Philips company the most important constituents of the cartel are the Osram concern, which was formed by the Siemens and Halske Company, the A.E.G., and the Auer (Welsbach) Company; the French Compagnie des Lampes, and the English Electric Lamp Manufacturers' Association (Elma). Switzerland and Austria are represented by the Licht A.G., Ver. Gluhlampenfabriken (Goldau), in which capital participation is held by Philips and Osram; and Hungary is concerned through the Ver. Gluhlampen und Elektricitäts A.G., of Ujpest.

The organisation of the cartel took place on January 15th, 1925, through the formation of the Phoebus, A.G. fur die Industrielle Entwicklung des Beleuchtungswesen (the Phoebus Industrial Company for the Development of Lighting), with a share capital of 500,000 Swiss francs. Each of the members of the cartel entered into a separate agreement with this company. Among other matters the contract regulates the interchange of patents and experience; each member may use the patents and methods of production of the other constituents on payment of reasonable compensation. The contract further provides for the organisation of the sales business. Selling is left to the sales organisation of the members, although fixed quotas are arranged and vary according to the development of the different markets. Thus no price cartel exists in the sense that direct and proportionate fixing of prices is one of the essential characteristics of the contract. Definite prices seem only to be prescribed for those countries which either have no glow-lamp industry or only an insignificant one. All the constituents of the cartel are concerned with a large number of other companies through their respective subsidiary companies or are interconnected with each other, the different interests being of quite a complicated nature into which it is unnecessary to enter.

In the case of the Philips company the centre of gravity is now changing over from lamps to wireless apparatus. The annexed table shows the total Dutch exports of the two classes in the first nine months of the current year and in 1928:—

Year.	Lamps. Florins.	Radio apparatus. Florins.
1928	17,491,000	14,074,000
1929	21,397,000	58,924,000

It will be seen that the value of the exports of radio sets, &c., has increased four times in the current year as compared with the corresponding period in 1928, whereas the value of the latter in the first nine months of 1928 was less than that of the exports of lamps.

Electricity for the Home.

Notes on the progress made in domestic electrification by the Tunbridge Wells electricity undertaking.

OWING to its situation on the beautiful Kent and Sussex border, and to its medicinal waters, Tunbridge Wells has long been a favourite town of resort and residence. On this account the domestic load is of considerable importance to the municipal electricity undertaking (engineer: Mr. R. N. Torpy, M.I.E.E.), and this fact is thoroughly appreciated. A great deal has been, and is being, done by the Electricity Department to build up the domestic load, and its efforts have been very successful. The water-heating demand, in particular, is of considerable dimensions. The Department has not yet opened showrooms of its own, but steps are being taken to that end. A British Empire Exhibition is held at Tunbridge Wells each year, in October, and the Department and local electrical contractors contribute very largely to the success of the display, while, in turn, the exhibition always leads to additional consumers.

Fig. 1.—A " Creda " Cooker.

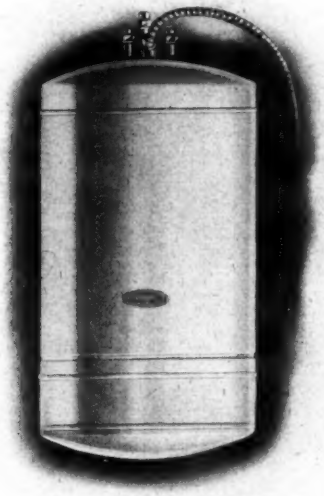


Fig. 2.—An " Inventum " Water-heater.

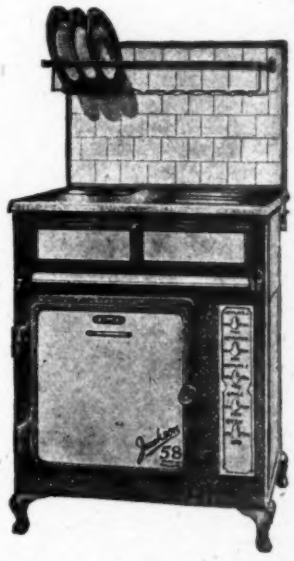


Fig. 3.—A " Jackson " Cooker.

All wiring work in the Royal Borough is carried out by the local contractors. The Department has an assisted wiring scheme for houses of a rental not exceeding £60 per annum, for which a schedule has been drawn up. The consumer is charged 17 per cent. per annum of the gross cost of the installation over a period of seven years, or 10 per cent. per annum for 14 years, at his option, these rates including maintenance. At the end of the fixed period a nominal rental of 1d. per quarter per lighting point and 2d. per heating point is charged. The cost of a lighting point (including a plain pendant, but not lamp or shade) is 22s. 6d. Heating and cooking circuits cost 1s. 5d. per foot run from the Corporation fuses, plus the cost of the fuseboard, &c. Every effort is made to give the work to the contractor responsible for the introduction of the consumer.

The flat rates are very low, but there are also attractive one for the town and Southborough, the other for outside areas. (The undertaking has an area of supply totalling 400 sq. miles.) The following notes apply to the Tunbridge Wells district:—

The flat rates are very low, but there are also attractive two-part tariffs. There are two methods of assessing the fixed charge. The first is based on the ratable value; for houses up to £10 ratable value the annual charge is 20s., and for larger houses it is 10 per cent. of the ratable value. The other method takes account of the number of rooms; living rooms, halls, &c., are charged at 22s. 6d. per annum and bedrooms at 7s. 6d. In both these tariffs the running charge is ¾d. per kWh. There is also a special domestic rate applicable to premises in which cooking and/or water-heating apparatus is installed. In this the fixed charge is calculated on either of the foregoing bases, and the running charge is only ½d. per kWh. Energy for domestic water-heating can be obtained at a fixed charge per quarter ranging from £3 5s. for a 22-gal. cistern to £1 6s. for a 1½-gal. cistern; this does not include the hire of apparatus. Although not a domestic matter, it is worth mentioning that after-hours shop-window lighting can be done at the special rate of 1d. per kWh plus time-switch rental; no fewer than 250 shops take advantage of these favourable terms.

The Department has an apparatus hiring scheme, but does not sell appliances. This scheme covers cookers, water-heaters, and wash-boilers. The cookers employed are " Creda " and " Jackson " models of various sizes fitted with " Sadia " hotplates, and the charge for them ranges from 5s. to 12s. 6d. per quarter.

There are four " Creda " models available, one of which, the " C.195 " (for 4 to 7 persons), is illustrated in fig. 1. This has a " de luxe " finish which employs white vitreous enamel for the oven and hot-cupboard door panels, switchplate and oven sides, and granite grey for the hob, feet, front frame, door frame, and base. There is a mottled removable oven interior and the switchbox cover is in polished aluminium. The oven is 13 in. high and wide and 12½ in. deep, and has a loading of 2,100 W. The grill loading is 1,500 W, and that of the boiling plates is 2,000 W for the 8¾-in. and 1,200 W for the 7-in. plates. There are also four " Jackson " cookers, and we illustrate one of the larger patterns (No. 56) in fig. 3. This, too, is all-enamelled and is provided with a thermometer. It is designed to cater for 14 persons

and has an oven measuring 19 in. by 15 in. by 17 in., the loading being 2,750 W. The two boiling plates are rectangular; the larger is 8 in. by 7½ in. and is loaded to 1,800 W, and the smaller measures 8½ in. by 6 in. (1,500 W). The grill (11 in. by 8 in.) has a loading of 1,800 W. There is a number of special features incorporated in the cooker, such as the protection and accessibility of the wiring; the mounting and lettering of the switches; and the easily detached elements. The water heaters employed by the Department are of the "Inventum" pattern, the sizes being 1½, 4½, 10, and 22 gallons; the quarterly charge ranges from 1s. 6d. to 5s. 7d. A typical "Inventum" water heater is shown in fig. 2. The wash-boiler supplied at a charge of 2s. 6d. per quarter has a capacity of 10 gallons; it is of galvanised copper and is equipped with a three-heat switch.

The Department has a rapid and efficient maintenance service, and the consumer's convenience is studied in every way. During a recent visit to the undertaking we were shown several letters from satisfied consumers containing very glowing and entirely unsolicited tributes to the Department. In some cases it was stated that the electric way was actually cheaper than other methods, apart from its distinct advantages. Practically every new house in the town is wired for both lighting and other services, and the number of all-electric houses is growing.

Artistic Electric Radiators.

A combination of attractiveness and utility has been efficiently embodied in the "Pellon" radiators

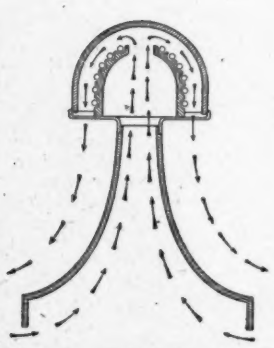


Fig. 4.—Principle of "Pellon" Radiator.

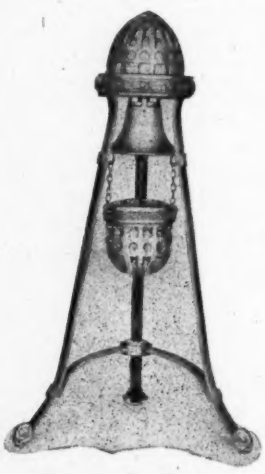


Fig. 5.—The "Canterbury" Model.

produced by the British Electrical & Manufacturing Co., 7 to 13, Clavering Place, Newcastle-on-Tyne. They are certainly a distinct break away from the traditional grate style, and their "down and out" principle of heat distribution is self explanatory from the diagram in fig. 4. Fig. 5 shows the "Canterbury" model which is especially suitable for entrance halls; it can be supplied in any finish to suit requirements. The heating element is situated under the dome, which is chromium plated to prevent discoloration. Between the supports is a brazier slung by three chains and controlled by a separate switch, so that a very pleasant warm glow may be obtained without the use of heat. The loading is 1½ kW for the radiator.

Domestic Supply in Victoria, Australia.

The Victorian Electricity Commission has had a two-part tariff operating for some years, and there is no doubt that the majority of consumers benefits greatly thereby. In the Essendon-Flemington district, which is the only suburban area in which the Commission retails energy, according to the *Electrical Engineer of Australia and New Zealand*, the charge is 1s. per main room per month, plus 1¼d. per kWh. An analysis has been taken of several homes equipped with electric lighting and appliances, and the figures of consumption and costs for average cases are given in the following tabulation:—

No. in family	No. of rooms	Apparatus connected.	kWh per annum.	Annual cost. £	s.	d.	Cost per kWh.
4	7	14 lights ... ... 1 stove ... ... 1 iron ... ... 1 kettle ... ... 2 radiators	2,922	19	8	4	1.59
		1 continuous water heater	3,456	9	0	0	1.07
3	4	7 lights ... ... 1 stove ... ... 1 vacuum cleaner ... ... 1 iron ... ... 1 water heater booster	1,290	9	2	5	1.69
		1 continuous water heater	864	2	5	0	1.26
3	5	13 lights ... ... 1 stove ... ... 1 iron ... ... 1 vacuum cleaner ... ... 1 water heater booster ...	1,722	11	19	5	1.67
		1 continuous water heater	824	2	2	10	1.33
9	10	12 lights ... ... 1 iron ... ... 1 radiator ... ... 1 kettle ... ... 1 stove ... ... 1 washing machine... ... 1 vacuum cleaner ... ... 1 water heater booster ...	3,612	23	17	5	1.5
		1 continuous water heater	1,623	4	4	6	1.24
5	7	13 lights ... ... 1 stove ... ... 1 iron ... ... 1 vacuum cleaner	2,714	23	10	11	2.08
3	5	8 lights ... ... 1 stove ... ... 1 iron ... ... 1 radiator ... ... 1 vacuum cleaner	2,060	13	14	7	1.6

Domestic Tariffs: 0·5d. (or less) per kWh.

Additions to the List in our Special Supplement of November 15th, 1929.

Undertaking.	Engineer.	Primary charge basis, per annum. R.V. = *Ratable Value.*	Secondary charge. Pence per kWh.	Hire, hire-purchase, assisted wiring or rental wiring.
Birkenhead Corporation ...	F. E. Spencer ...	18% R.V. (Min. £18)	0.5	H, H-p, and AW
Hamilton Burgh	W. J. Cooper ...	15% R.V.	0.5	H-p
Leigh Corporation	J. B. Huds n ...	12½% R.V. (Min. £16)	0.5 after 5 kWh per qtr. per £ R.V.	H, H-p, and AW
Luton Corporation	W. H. Cooke ...	—	0.5	None
Sale U.D.C.	C. J. Wood ...	£20, £15 and £10 R.V.	0.5	H, H-p, AW and RW
Stretford U.D.C	T. A. Kerr ...	15% (Min. £10)	0.5	AW

Referring to the "Domestic Tariffs" inset in our issue of November 15th, the following should be noted: The charges given for the Bradford Corporation electricity undertaking relate to half-yearly periods, and those for the Liverpool Corporation electricity undertaking relate to quarterly periods.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

E.D.A. Sales Conference.

At the first of the 1929-30 E.D.A. Manchester Sales Conferences, which was held at the Lighting Service Bureau, on November 20th, Mr. R. J. Hebbert, of Ferranti, Ltd., read a paper on "Domestic Water Heating." He said that there were several large water-heating installations now in hand in this country, for which electricity was to be supplied during off-peak hours at prices of ½d. per kWh and less. A good load factor would justify a low tariff. All types of water-heating were not entitled to low tariffs. Certain types represented a bad form of load; which economically should be charged for at a high rate. The instantaneous geyser capable of a furnishing a hot bath in ten minutes ought not be be rated at less than 20 kW, and a number of them would represent a very troublesome load. It could not be too strongly emphasised that anything in the nature of a circulating pipe system to give instant hot water at the taps was prohibitive, on account of the loss of heat entailed. He was of the opinion that a storage capacity of 20 gallons represented the smallest size of heater that should be recommended for special supply to individual outlying hot water points. It was advisable, in order to make the most of the heat storage capacity, that the thermostat should be set as near as possible to the boiling point of the water. On the question of the price at which the use of electricity for water-heating could be made economically attractive to the consumer, from personal experience at ½d. per kWh, electric heating of water for the small household did compare favourably with cost of equal service obtainable by any other means. It was noteworthy that the areas in which the water-heating load had been most successfully encouraged were those in which the apparatus was offered on terms of hire. Those supply authorities who were in a position to offer rates of less than ½d. per kWh would probably find it more profitable rather to take this opportunity to charge a little more for the energy and devote some part of the expected additional revenue to assistance in the capital cost of the consumer's installation.

Ideal Home Exhibition Competition.

Entrants to the competition for British architects, decorative artists and electrical contractors organised by the *Daily Mail* in conjunction with the General Electric Co., Ltd.—the winning designs of which are to be incorporated in the "Pavilion of Light" which the company has undertaken to erect at the Ideal Home Exhibition at Olympia in March—are reminded that designs and schedules should be addressed and despatched so as to arrive at *Daily Mail* Electrical Competition, Carmelite House, E.C.4, not later than midnight December 14th. It is stipulated that no name or mark or sign must be placed on the drawings, or on the package containing them, by which the author may be identified. Drawings must be packed flat in a sealed package, and be accompanied by an opaque envelope (which must be securely fastened to the drawing) containing the name and address of the author, with a declaration that the design is his or her own personal, original work, and that the drawings have been prepared under his or her own personal supervision.

Catalogues Wanted.

Mr. E. Marsden, the new electrical engineer of Louth, Lincs., asks for manufacturers' catalogues, &c.

Recent Contracts.

It is announced that Messrs. Babcock & Wilcox, Ltd., have received an order from the Cia Italo-Argentina de Electricidad, Buenos Aires, for the initial section of the boiler-house equipment for the Nuevo Puerto "super"-power station; the value of the order is put at £282,000. Another contract received by the company is for the boilers in the new power station of the Bahia Blanca Electric Co., having a value of about £65,000.

Among recent contracts obtained by Holophane, Ltd., is one for the complete lighting installation at the new Egyptian University, Ghizeh. A number of large and special fittings are to be installed in the new buildings.

Messrs. W. Crockatt & Sons, Ltd., have recently received orders for their "Crockatt-Simplex" patent electric salinometer from the Chilean Naval Commission (twelve sets); the Imperial Government Railways, Tokio (large outfit with motor-generator set and switchboard); a large Italian shipyard (two outfits); and the British Admiralty.

An order for steelwork in connection with the electrification of the Manchester-Altrincham line, valued at about £50,000, has been placed with Messrs. Edward Wood & Co., Ltd., Trafford Park, Manchester.

Electricity in Tanganyika.

The Times reported on November 19th that one of the questions to be raised at last week's meeting of the East African Section of the London Chamber of Commerce was the delay in the adoption of a scheme for supplying electrical power to Tanganyika Territory, which has been under discussion for two or three years. Part of the proposed scheme involves the utilisation of the Pangani River Falls, and it was stated in July that two out of five tenders then remained for further examination, and that a decision was likely to be given at the beginning of August. There was then a further delay, and commercial firms were informed that a definite decision would be reached by the end of October. The necessary work involved in this plan was expected to occupy about two years, and to involve an outlay of about £250,000, while the cost of the complete scheme for supplying electricity to the ports of Dar-es-Salaam and Tanga and inland territory has been estimated at twice that sum. The continued delay in reaching a decision on terms is regarded by commercial firms as especially unfortunate as the sisal and other industries are progressing rapidly. It is suggested that in the absence of a big scheme, such as has been proposed, they may feel compelled to equip their plantations further with motor-engines, and there might then not be the same opportunity for utilising to the full the electrical power if and when it is ultimately provided.

German Electricity Supply Profits.

A return lately issued by the German Government Statistical Department shows that during last year 64 electricity supply concerns in Germany, with a combined share capital of £35,760,000, reported a total net profit of £2,765,000, equal to approximately 7.4 per cent., as against 7.2 per cent. in 1927. Of the net profit £2,530,000 was distributed in dividends to the shareholders, the average dividend being 7.07 per cent, as compared with 7.09 per cent. in the preceding year.

New German Companies.

The following companies have recently been formed in Germany in connection with electricity supply. The Hanover Stromversorgungs Gesellschaft, Hanover, capital £300,000; and the Teltower Kreiswerke Gesellschaft, Nowawes, capital £320,000.

Patent Application.

The Société Alsacienne de Constructions Mécaniques has applied for the restoration of Patent No. 245,776 relating to "Improvements in or relating to welding or cutting by electric arc," which was allowed to lapse in January last. Notice of opposition must be lodged with the Patent Office by January 20th next.

The Committee on Finance and Industry.

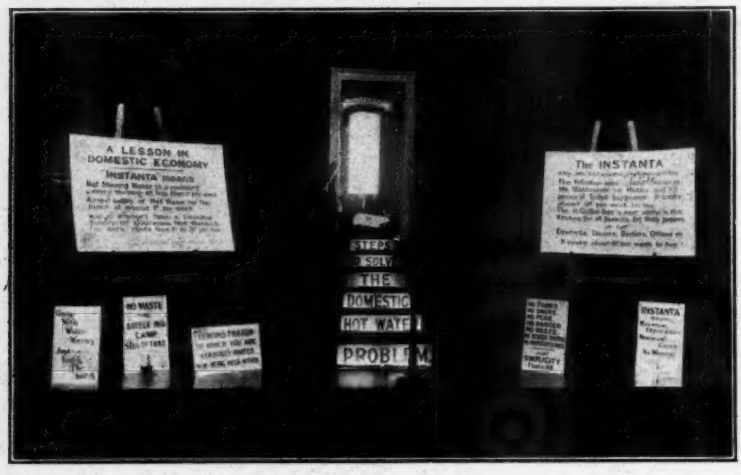
The Committee on Finance and Industry which the Government recently appointed under the chairmanship of Mr. H. P. Macmillan, K.C., held its first meeting on November 21st. Procedure and the nature of the evidence to be taken were discussed.

Effects of the Wall Street Crisis.

It was announced last week that among the other events taking place in the United States with a view to lessening the effects upon trade and industry of the Wall Street slump in security values, there had been held a conference between the President and other statesmen and the railway authorities, at which the latter had undertaken not to reduce their forward programmes for construction work. The *Times*, quoting the American *Financial Chronicle*, now reports "that the gross earnings of seven railroads in the second week in November decreased 16.23 per cent."

A Novel Water-heating Demonstration.

The Southampton Corporation Electricity Department (engineer: Mr. W. G. Turner) has recently arranged its window in a novel fashion to advertise the virtues of electric water heating. As will be seen from the accompanying picture a staircase has been set up in the centre leading up to the open door of a bathroom. On the risers of the stairs there are illuminated cards giving an appropriate message. Apart from these cards the demonstration commences in darkness. A shadowy form runs up the stairs into the bathroom, the inside of which is suddenly and brilliantly illuminated, revealing a large white-enamelled storage geyser mounted on the wall with another, smaller, model resting on a cushion on the floor. The water-heaters employed are of the "Instanta" pattern (made by Messrs. Chas. Joyner & Co.) in 11-gal. and 1½-gal. sizes. Cards arranged about the window give details of the system and its advantages.



A Water-heating Display at Southampton.

Change of Address.

The address of the Chester City Electricity Department is now 22, Northgate Street. (Telephone: Chester 1562-3.)

Social Events.

The first dance of the season was held at Magnet House on November 8th, when there was a good attendance. The arrangements were in the capable hands of Miss Harbour and Mr. Nash, and a very successful evening was the outcome. On November 9th a social evening was held at Magnet House, when the "Wilson" and "Byng" tennis challenge cups were presented to the winning teams by Mrs. F. P. Driver in the unavoidable absence of the donors, Mr. C. Wilson and Mr. E. G. Byng. These trophies were won by the Osram Lamp Works men's team and the Magnet House (London) ladies' team, respectively. Singing and dancing interspersed with conjuring and ventriloquial entertainments by various G.E.C. "stars" contributed towards a very pleasant evening.

Visit to Osram Lamp Works.

A representative party of East Anglian Corporation and railway engineers visited the Osram Lamp Works, Hammersmith, recently. Much time was spent in witnessing a number of interesting manufacturing operations during the morning, after which the party were entertained to luncheon by Mr. C. Wilson, managing director of the Lamp Works, who extended a hearty welcome to the visitors. Subsequently the Osram Glass Works and the G.E.C. Research Laboratories were visited, and many new developments were inspected. Mr. F. Crush, manager of the Ipswich branch of the company, acted as guide to the party, which included Messrs. T. Edge, G. L. Garton, F. A. Fairhead and A. Starratt (Ipswich Corporation), A. C. Green (Norwich Corporation), W. C. Cooper (Bury St. Edmunds), Mr. Chapman and Mr. Baker (Colchester), with Messrs. C. N. Brown and A. G. Smith of the L.N.E.R. (Ipswich) Electrical Engineers' Department.

Merchandise Marks Inquiry.

Motor vehicle chassis and parts and automobile batteries will form the subject of the next inquiry by the Standing Committee under the Merchandise Marks Act, 1926. Communications should be directed to the Secretary of the Committee, New Public Offices, Great George Street, S.W.1.

Wages in the Cable-Making Industry.

The Joint Industrial Council for the Electrical Cable-Making Industry informs us that there will be no cost-of-living change in wages in the industry on the third pay day in December.

New Italian Companies.

Among the companies recently formed in Italy are the Società delle Officine Elettromeccaniche Perego e Cia, Milan; La Società Ligure Lombarda Elettrotechnica, Milan; La Società Impianti Linee Elettriche Telefoniche, Milan; La Società Elettrica Valdostana, Turin; and La Società Fabbrica Lampada Elettriche de Montel Fled, Rome.

Employment during October.

According to the November *Ministry of Labour Gazette*, employment in the engineering industry last month was still slack, although upon the whole there was a slight improvement. In the electrical engineering branch conditions remained fairly good. The number of unemployed in the engineering industry as a whole declined from 93,750 to 90,536, the proportion falling from 9.3 to 9.0 per cent. The electrical engineering section recorded a decrease of 20 in the number of unemployed (3,462), and the percentage (4.1) remained unaltered. In the electrical cable, wire, and lamp manufacturing group the number of unemployed increased from 3,764 to 3,791, but the proportion remained at 4.0 per cent. The number of unemployed in the electrical wiring and contracting industry rose from 1,007 to 1,047, and the percentage from 6.1 to 6.3. Readers who follow these figures month by month will notice that the percentages given for September have been altered. This is due to a revision based on the numbers insured in July last; the figures originally given were calculated on the numbers insured in July, 1928. The latest statistics give the following as the estimated numbers employed in the branches of industry with which we deal:—Engineering, 1,003,280; electrical engineering (included in engineering), 84,430; electrical cable, wire and lamp manufacturing, 93,970; electrical wiring and contracting, 16,610.

A G.E.C. Christmas Display.

The accompanying illustration shows part of the trade counter of the General Electric Co., Ltd., at Magnet House, Kingsway, W.C.2. This has been specially decorated for the Christmas season and is devoted mainly to lighting. "Osram" lamps are used in a generous manner and the main feature is the display of Christmas-tree lighting sets, some of which are hidden in the foliage with which the upper part is decorated. Cartons containing these sets are arranged on the counter, while in two showcases at the front there are examples of some of the company's smaller products—kettles, handlamps, toasters, &c.

The G.E.C. Trade Counter Decorated for Christmas.

Unemployment.

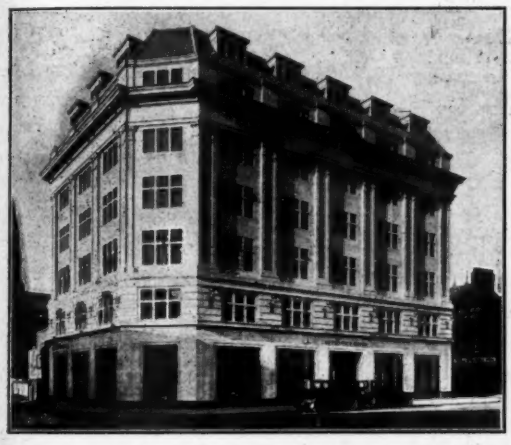
There was an increase of 7,142 in the number of registered unemployed during the week ended November 11th. At that date the total was 1,259,100, as compared with 1,251,958 on November 4th, and 1,348,158 on November 12th, 1928.

Municipal Trading at Nottingham.

As a result of an appeal by local electrical contractors, the Nottinghamshire and Derbyshire Traders' Association has forwarded to the Corporation, which proposes shortly to open new electricity showrooms, objections to any extension of municipal trading. Members of the Electrical Contractors' Association have also communicated to the Corporation Electricity Committee proposals that it should limit its trading to the following activities:—(1) Assisted wiring by direct labour only in Corporation property and workmen's houses paying under 10s. per week rent and rates; (2) te sale or hire-purchase of fittings, fires and accessories thereto and electrical conductors; (3) the hire of electrical cookers direct to the public. The Association also suggests that assisted wiring (other than that stated in clause 1) should be done by means of competitive tenders from the electrical contractors.

New Metro-Vick Premises at Newcastle.

The Newcastle branch of METRO-VICK SUPPLIES recently moved into new premises affording a great deal more accommodation. As will be judged from the illustration herewith the new building is of handsome proportions and a good example of modern architecture. It is situated at the corner of Northumberland Road and Ridley Place, facing the City Hall on one hand and the "Hippodrome" on the other. Thus it is conveniently situated in a developing part of the city. Floodlighting fittings can be seen in the picture.



The Exterior and the Lighting Fittings Showroom of the New Metro-Vick Supplies Branch, Newcastle.

We also reproduce a view of the showrooms. This section is devoted to lighting fittings which have been effectively arranged. The general decorative scheme is blue and silver. In addition there is a suite of model rooms—drawing room, bedroom, bathroom, kitchen, &c.—in which electrical domestic appliances are shown in operation.

Book Notices.

Congratulations to our contemporary, the *Indian Textile Journal*, of Bombay, upon reaching its fortieth year of publication. The occasion is celebrated by the issue of a special number dated October 31st which contains a survey of the textile industry of India, and the progress made by cotton mills, giving at the same time information regarding the part contributel by the journal in stimulating industrial development and financial enterprise. One of the lengthiest articles is a fully illustrated description of a new cotton mill with the most up-to-date machinery.

BRITISH INSULATED CABLES, LTD., has published an interesting brochure dealing with the Central Scotland Electricity Scheme. It describes the work of linking up the principal generating stations in the area carried out by the company. There are a number of illustrations, which show the different kinds of tower employed for the transmission lines, &c.

We have received a copy of the first number of *Metallurgia*, a monthly magazine (2s. 6d.) which is to be devoted to the interests of the British metal industries. It is issued by the Kennedy Press Ltd., of Manchester.

"An Outline of Advertising," by E. O. Hughes. Pp. xii+162; illustrated. Price 7s. 6d. net. London: Chapman and Hall, Ltd.

"High Voltage Cables," by L. Emanueli. Pp. vi+107; figs. 81. Price 8s. 6d. net. London: Chapman & Hall, Ltd.

The Melbourne and Metropolitan Tramways Board has produced a booklet describing the growth and development of the tramway system of the metropolis since the inauguration of the Board in 1919.

"The Practice of Spectrum Analysis with Hilger Instruments," compiled by F. Twyman, F.Inst.P., F.R.S. Fourth edition. Pp. 38. Illustrated. London: Adam Hilger, Ltd. Price 1s. 6d. net.—The purpose of this compilation is to supply a guide to those intending to take up spectrum analysis for practical purposes, and the contents include chapters on spectrometers and spectrographs, quantitative spectrum analysis, various types of spectrum, &c. The production of this publication is good and it should prove of use to those interested in the subject.

"Theory and Practice of Alternating Currents," by A. T. Dover. Second edition (revised). Pp. xv+539; figs. 303. London: Sir Isaac Pitman & Sons, Ltd. Price 18s. net.

"Heaviside's Operational Calculus," by E. J. Berg. Pp. xiii +214; figs. 64. London: McGraw-Hill Publishing Co., Ltd. Price 15s. net.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLVIII. Number 1929. No. 11. New York: The Institute. Price $1.

The A.C.E.C.'s Twenty-five Years.

The ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI celebrate their 25th anniversary this year, and to mark the occasion have published a special issue of their Quarterly Review. In this the history of the concern is outlined, and particulars are given of the evolution of the construction of electrical machinery, apparatus and cables during the period. It is pointed out that the A.C.E.C. are the successors of the Société "Electricité et Hydraulique," which was founded in 1886, and equipped the first central station in Charleroi, and installed the Ostend electric lighting scheme. By a melancholy coincidence the death of the founder of the A.C.E.C., General Baron Empain, occurred recently. An inset containing a memoir and portrait is included in the Review. The publication is very well illustrated with views of the A.C.E.C. works. The whole of the text is in Fernch.

Trade Announcements.

Messrs. GEO. L. SCOTT & CO., LTD., 60-66, Rochester Row, S.W.1, have taken over the representation of the interests of the Forges et Ateliers de Constructions Electriques de Jeumont from Mr. E. E. Garrard, 82, Victoria Street, S.W.1, and are in a position to quote for paper insulated cables and bare copper wire.

Messrs. HEWETSON, SON & CO., of London, have opened a branch business at 8, King's Road, St. Leonards, Hastings, for radio and electrical work.

To cope with expanding business, the HENDERSON WIRELESS AND ELECTRICAL SERVICE has taken over the whole of the corner premises of 54, Queen's Road, Brighton.

The Lincoln district office of CALLENDER'S CABLE & CONSTRUCTION CO., LTD., is now at 5, Broadgate. (Telephone: 654; telegrams: "Callender, Lincoln.") Stocks of v.i.r. cables and flexibles are available at the new address.

On and after December 7th the address of BRITISH BROWN-BOVERI, LTD., will be 56, Victoria Street, S.W.1. (Telephone: Victoria 1603-4; telegrams: "Reactance, Sowest, London.")

New French Company.

A company has been formed in Paris (80, Boulevard Republique) with the title La Société Auto-Câble, Fabrique de Fils et Câbles et Equipement Electrique des Automobiles, to manufacture electric wires and cable for use on motor vehicles.

Wages in the Engineering Industry.

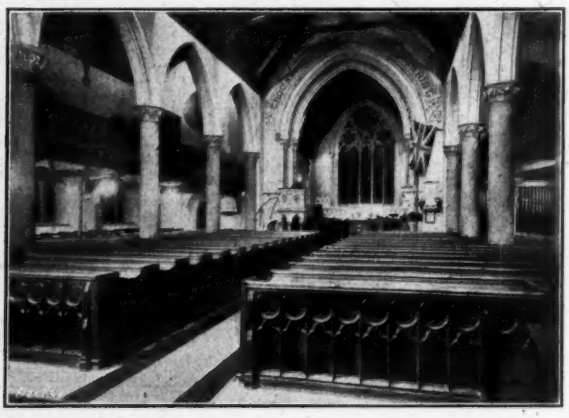
On November 21st there was a conference in London between representatives of the Engineering and Allied Employers' Federation and of the trade unions in the engineering industry. The unions again put forward their request, which was deferred in May last, for an increase of 8s. per week in the wages of time workers with corresponding increases in piece-work rates. For the Federation, Sir Allan Smith pointed

to the uncertainty which existed with regard to the Government's handling of the unemployment problem and the added burdens of social services. The Government's disarmament policy, too, was bound to have serious effects upon the industry. Therefore, although the employers were willing and anxious to pay higher wages they found it impossible at present to concede any increase.

The employers' decision is to be discussed at a meeting in January when future action will be considered.

A Church-Lighting Installation.

The modernising of the electric lighting installation in the Immanuel Church, Streatham, S.W., has recently been completed by Messrs. Thorne & Hoddle, Ltd. In the old direct-lighting scheme the installation consisted of four-light chandeliers down the centre aisle and in the chancel, and five-light chandeliers both under and over the gallery. In the new scheme the chancel and nave are lit by reflectors concealed in



The Lighting in Immanuel Church, Streatham.

the roof and the space under the galleries by small Holophane fittings. For the lighting of the nave sixteen "Stilleto" 100-watt reflector fittings are used. The side aisles are lighted by four refractor reflector 150-watt fittings under each gallery, and the choir by six fittings similar to those used in the nave, three being fixed on either side and concealed behind the wall of the chancel arch. The altar itself is illuminated by two similar fittings concealed behind the roof trusses. The accompanying illustration shows the effect of the new illumination.

Bankruptcy Proceedings.

G. E. Ward, dealer in wireless accessories, 13, Queen's Road, St. John's Wood, N.W.—An application was made on November 19th to Mr. Registrar Mellor, at the London Bankruptcy Court, for an order of discharge on behalf of this bankrupt, who failed in December, 1927, with payable claims of £450, and assets of £20. According to the Official Receiver's report, the applicant, in 1922, purchased 28,000 accumulators from the Disposals Board for £7,000; he rented an office at 79, Mark Lane, E.C., and traded as the City Accumulator Co. The trading was very successful; he subsequently purchased many parcels of wireless accessories from the Disposals Board, and opened shops at 10, Rupert Street, W.; Bournemouth; 10, Rangoon Street, E.C.; and Central Street, Leeds. In April, 1925, following upon embezzlements by employés and a slump in the wireless trade, he became short of liquid capital, and C.A.C. Radio, Ltd., was formed, with a capital of £20,000, to take over the various businesses. The company was not successful, and went into liquidation in May, 1926. After the liquidation the bankrupt was pressed by creditors, and he filed his petition. He attributed his insolvency to the collapse of C.A.C. Radio, Ltd., and to his liability for debts which the company agreed to take over, but failed to discharge. The only fact reported in opposition to the application was the insufficiency of assets to equal 10s. in the £ on the amount of the liabilities. His Honour granted a discharge subject to judgment for £2, to be satisfied by an immediate cash payment.

W. H. Thornton, electrical and wireless engineer, Bridge Street, Burnley.—This debtor appeared for examination at the Burnley Bankruptcy Court on November 19th. He attributed his deficiency of £635 to shortage of capital, bad trade, and keen competition. He said that from 1922 to 1926 he was employed as a radio manager in Burnley at £250 a year. In 1926, the firm was taken over by two limited companies, and he was appointed director and secretary of each company. In July, 1927, the companies, in which he had 300 £1 shares, went into liquidation, the assets being insufficient to make a return to shareholders. In 1927, he commenced business as an electrical and wireless engineer with a capital of £23. The business was successful for twelve months, but he executed a deed of assignment in April this year. At present he was employed by a firm of electrical engineers. The examination was adjourned to be closed.

Mabel Woolldridge (trading as the Woolldridge Radio Co.), 26 & 39, Lisle Street, W.C.—This bankrupt, who failed in October, 1928, applied on November 19th, at the London Bankruptcy Court, for an order of discharge. The Official Receiver reported that the provable claims amounted to £332 and no assets were disclosed. The applicant began business in 1923 with another person as wireless dealers at 39, Lisle Street, under the style of "S. Hawkins." The partner withdrew in 1924, and the bankrupt continued the business alone until the end of 1925, when she closed down and sold the stock. In May, 1926, she restarted at the same address under the style of the "Woolldridge Radio Co."; that business was acquired by a company, of which the bankrupt was appointed a director; it did but little business, and a receiver was appointed by a creditor in August, 1928. Early in 1927 the bankrupt also started as a wireless dealer in her own name at 22, Lisle Street; that business was acquired in May, 1927, by "M. Woolldridge (Wireless), Ltd.," and she was again appointed a director, which post she held at the date of her failure. The bankrupt attributed her insolvency to liabilities incurred on behalf of a company, for which she was held personally responsible, and to law costs. The discharge was suspended for three months.

Williams & Gill, 1, Station Road, Church End, Finchley, Middlesex, lately electricians.—The public examination of these debtors was held on November 14th, at the Court House, Barnet. A statement of affairs was presented showing liabilities of £1,132, against assets estimated to produce £14, leaving a deficiency of £1,118. The separate estate of the debtor Gill showed liabilities of £44, and assets of the estimated value of £3. The debtor Davidson had liabilities of £207, and no assets. It would seem that the debtors formerly traded together in partnership as Williams & Gill, the business being started in 1914 by the debtor Gill and another. Davidson became a partner some years later, and subsequently the other partner retired. In July, 1928, Davidson left the business. The examination was closed.

F. H. Graham, 14, Hilltop Avenue, Harehills, Leeds, electrician. The following are creditors in this recent failure:—

	£		£
Electric Lamp Factors	70	Scattergood & Johnson,	
Metcalf & Co.	77	Ltd.	33

J. Cameroff, 147, Spencer Place, Leeds, electrical engineer. The following are creditors in this recent failure:—

	£		£
Milne & Needham, Ltd.	274	Electric Conduits, Ltd.	...25

Ivy Turner, wireless dealer, 103a, Little Ilford Lane, Manor Park, E.—This debtor attended on November 19th at the London Bankruptcy Court, and passed her public examination upon accounts showing liabilities of £51 and assets of £8. She stated that in 1924 she began dealing in electric lamps under the style of Turner's Cash Co., and a year later she traded as a wireless dealer in the name of I. Y. Turner & Co. The business gradually declined, and, a writ having been issued against her to recover £21, she filed her petition.

G. Cohen, electrical engineer, 49, Newman Street, Oxford Street, W.—Application for discharge to be heard at 1, Carey Street on December 11th.

H. H. D. Radcliffe & F. Haddleton (City Electric Services), electrical engineers, 51, Islington Row, Birmingham.—Last day for proofs for dividend December 4th. Trustee, Mr. C. Hoult, Official Receiver, 191, Corporation Street, Birmingham.

F. Price & C. Tarver (F. Price, Tarver & Co.), electrical engineers 15, Working Street, Cardiff.—Last day for proofs for dividend December 4th. Trustee, Mr. E. Owen, 34, Park Place, Cardiff.

H. Gascoigne, wireless dealer, &c., 40, Cricklade Street, Cirencester.—Receiving order made November 19th, on debtor's own petition.

A. Angers (A. Angers & Co.), electrician and mechanical engineer, 10, Hatton Garden, Liverpool.—Trustee, Mr. J. Allcorn, Official Receiver, Government Buildings, Victoria Street, Liverpool, released November 11th, 1929.

T. F. Collier, electrician, 116, Union Street West, Oldham.—Trustee, Mr. J. D. Turner, Official Receiver, Byrom Street, Manchester, released November 15th, 1929.

J. J. Latham, wireless dealer, &c., 3, Brickhouse Street, Burslem.—First and final dividend of 10d. in the £, payable December 2nd at the Official Receiver's office, 12, Lonsdale Street, Stoke-on-Trent.

E. G. M. Page, dealer in wireless sets and accessories, 46, Bohemia Road, St. Leonards-on-Sea.—First and final dividend of 20s. in the £, payable at the Official Receiver's office, 12a, Marlborough Place, Brighton.

Company Liquidations.

Accumulators of Woking, Ltd.—The notice published here last week referred to a purely formal meeting, to be held on December 17th, in connection with the liquidation, last year, in which the present company (Accumulators of Woking (1928), Ltd.), took over the business as a going concern. We understand that the present company has materially benefited from the financial and manufacturing re-organisation that has taken place.

Manchester Magneto Co., Ltd.—A meeting of members is called for December 23rd at the offices of Messrs. A. L. Price and Co., 8, Exchange Street, Manchester, to hear an account of the winding up from the Liquidator, Mr. A. L. Price.

Local Exhibition.

HARLE SYKE (BURNLEY).—Alderman H. R. Nuttall, J.P., Mayor of Burnley and chairman of the Electricity Committee, on November 21st, opened an exhibition of electrical appliances at Harle Syke. He said that the day was long past when electricity was regarded as a luxury. Every home ought to have an abundant and cheap supply, for electricity was a big saver of labour, and was safe and clean.

A Hand-Lamp Window Display.

BATTERIES, LTD., Redditch, has sent us a photograph of a window display which it has designed for the use of dealers in its "Nife" hand-lamps, which are equipped with "all-steel" accumulators. It is a simple but effective aid to selling. The company has also sent us a price list of these lamps and low-tension accumulator batteries for radio.

New Catalogues and Lists.

SIEMENS BROS. & CO., LTD., Woolwich.—A showcard illustrating in colour a merry magician producing a number of "Xcel" appliances.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Folder L.5234 containing illustrated particulars of "Magnet" bakelite electric bells and accessories; and List No. SL. 4986, dealing with stage spotlights suitable for theatres, kinemas, concert halls, &c. Interesting and seasonal features of the "Osram G.E.C. Bulletin" are illustrated articles on Christmas gifts and decorative lighting for Christmas.

SHAFTESBURY RADIO CO., 184-188, Shaftesbury Avenue, W.C.2.—Two illustrated leaflets describing the company's range of loud-speakers, units, &c. Priced.

Messrs. ADAM HILGER, LTD., 24, Rochester Place, Camden Road, N.W.1.—A well-produced brochure containing useful information on the choice of spectrographic outfits for metallurgical analysis, illustrating the company's wide range of products with prices.

Messrs. WARD & GOLDSTONE, LTD.—A pamphlet containing details of the "Mepic" electric shop window heater, the "Cozytowz" footwarmer for motor cars, and immersion heaters.

Messrs. J. J. EASTICK & SONS, Eelex House, 118, Bunhill Row, E.C.4.—The November issue of "Eelex Radio Bulletin" contains, in addition to notes on the company's activities and products, a number of news items of interest to the radio trade.

Messrs. MORTIMER & GALL, 26, Cheapside, E.C.2.—A card drawing attention to "Peter the Heater" for motor-car radiators.

DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, Middlesex.—A descriptive pamphlet dealing with the Drayton-Nicholson & Drayton differential steam traps.

Messrs. A. H. MCQUEEN & CO., LTD., 182, West George Street, Glasgow.—A pamphlet describing the "Whelan" stud stump extractor, and another dealing with switchboards manufactured by the company. Illustrated.

LIGHT RADIATORS, LTD., Medway House, Old Cavendish Street, W.1.—A broadsheet describing the company's day and night signs.

Messrs. FALK, STADELMANN & CO., LTD., 83-93, Farringdon Road, E.C.1.—Pamphlet No. P.1,375, containing an illustration and full details of the "Efesca" vacuum cleaner and attachments, together with a covering letter making a special offer to the trade.

The CARRIER-ROSS ENGINEERING CO., LTD., Victory House, 101, Regent Street, W.1.—An illustrated brochure describing the "Carrier-York" heat-diffusing system.

ELECTRIC ART SHADES (1928), LTD., Feering Factory, Kelvedon, Essex.—A priced and illustrated leaflet describing the company's new table standard.

Messrs. A. REYROLLE & CO., LTD., Hebburn-on-Tyne.—Pamphlet No. 777 describing the company's metal-clad air-break switches, fuses and plugs. Illustrated and priced.

BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, N.17.—A publication entitled "Blindfolded and Handcuffed," dealing with the benefits of correct lighting in industry.

N.V. TRANSELECTRA, Sarphatistraat, 43, Amsterdam.—Two illustrated price lists of "Ferram" electric lamps, lamp-caps, &c.

Messrs. L. ANDREWS & CO., 2, Whitworth Street West, Deansgate, Manchester.—A price list of "Wrendal" and "Capella" lamps.

Messrs. WILLIAM MCGEOCH & CO., LTD., 28, West Campbell Street, Glasgow.—Two illustrated publications dealing with "Klidos" cargo-connection boxes and "Lock-up" electric light fittings.

Messrs. J. H. EVANS & CO., 31, Dickinson Street, Manchester.—An illustrated leaflet drawing attention to the "Rightway" wheel drawer.

Messrs. ISENTHAL & CO., LTD., Ducon Works, Victoria Road, North Acton, W.3.—List C.1029, describing, with illustrations, "Carola" photo-electric cells and vacuum relays. Priced.

The SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, W.C.2.—A comprehensive illustrated list of electric fires containing examples of most of the leading makers' models, as well as "Sunco" designs. Priced.

The ENGLISH ELECTRIC CO., LTD., Queen's House, Kingsway, W.C.2.—Three illustrated descriptive publications:—K.43, the "English Electric" power-factor compensator; K.62, electric trolley-'buses; and K.66, "English Electric" air-operated controller for electric trolley-'buses.

Messrs. A. C. COSSOR, LTD., Highbury Grove, N.5.—An illustrated sheet showing the construction of the 1930 Cossor "Melody Maker."

Messrs. STEWARTS & LLOYDS, LTD., 41, Oswald Street, Glasgow.—A well-produced, illustrated catalogue of tubular steel poles for tramways, telephone lines, and other purposes. Very complete details are given of the various types.

EQUIPMENT & ENGINEERING CO., LTD., 2 & 3, Norfolk Street, Strand, W.C.2.—A leaflet drawing attention to the "Eco" double jet hot air hand dryer.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Nov. 26th.	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5½d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3½d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£175	£11 inc.
	Grade II.... ... ... ,, ,,	£122	£6 inc.
	Grade III ... ... ,, ,,	£68	£3 inc.
c	Brass (rolled metal 2' to 12' basis) per lb.	10½d.	...
c	,, Tubes (solid drawn) ... ,,	1/0½ to 1/1	...
c	,, Wire, basis ... ... ,,	10½d.	½d. inc.
c	Copper Tubes (solid drawn) ... ,,	1/3	...
g	,, Bars (best selected) ... per ton	£110	...
g	,, Sheet ... ... ,,	£110	...
g	,, Rod ... ... ,,	£110	...
d	,, (Electrolytic) Bars ... ,,	£84	10/- inc.
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ... ,,	£90	10/- inc.
d	,, ,, H.C. Wire per lb.	11½d.	¼d. inc.
f	Ebonite Rod... ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/3	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	8½d.	½d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton	88/-	13/6 inc.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£22 15s.	5/- dec.
g	Mercury ... ... per bot.	£23 to £23 5s.	5/- inc.
e	Mica (in original cases) small ... per lb.	3d. to 8/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/3½	...
p	,, ,, drawn bars & rods ,,	1/5	...
p	,, ,, rolled strip & sheet ,,	1/3½	...
p	,, ,, wire... ... ... ,,	1/6	...
o	Platinum ... ... per oz.	£13 10s.	...
d	Silicium Bronze Wire ... ... per lb.	1/2	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
g	Tin, Block (English) ... ... per ton	£189 10s. to £190 10s.	£13 15s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	2/6	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Reporting on November 23rd, Messrs. James Forster & Co. stated that in spite of support from producers early in the week, lead prices collapsed on Wednesday and Thursday last week, but on Friday a recovery took place. Owing to declarations of considerable quantities of American and Mexican lead due shortly, the backwardation ruling last week gave way to a contango. A fair business was done with consumers at the lower level of prices, chiefly for early delivery, and the demand was easily met, as supplies at the moment are more than sufficient for current needs. Continental demand remains exceedingly slow, with little business passing. The general position of the metal is deteriorating, with a tendency for supplies to exceed demand, and had it not been for the support afforded during recent weeks by the Producers' Association, it is certain that lower prices would have been seen in the market.

Lighting and Power Notes.

Ashford.—BULK SUPPLY.—At a special meeting of the Urban District Council held recently, the Electricity Committee reported upon the offer of the Kent Electric Power Co. for a bulk supply, but it was agreed that the Council should proceed with the negotiations with the Electricity Commissioners for the installation of a further engine at the works.

Aylesbury.—SPECIAL ORDER.—The Corporation is to apply to the Electricity Commissioners for a Special Order authorising it to extend its area of supply so as to include the parish of Brackenham in the rural district of Wycombe.

Bexhill.—PUBLIC LIGHTING.—The Corporation Electricity Committee has considered the improvement of the lighting of the parade and the parade shelters, and decided to inspect the present lighting system with a view to submitting a full report.

Biggar (Lanarkshire).—ELECTRICITY SUPPLY.—The Town Council is considering an offer from the Clyde Valley Electrical Power Co. to lay a transmission line from Lanark to Biggar for the purpose of supplying the burgh with electricity.

Bolton.—CHANGE-OVER.—The Corporation has given notice of its intention to apply to the Electricity Commissioners for consent to standardise the a.c. system of supply throughout its area of supply.

Bolivia.—HYDRO-ELECTRIC DEVELOPMENT.—The Government has granted permission to the Bolivian Power Company to acquire the water rights at the Zongo Falls, and to erect a hydro-electric plant developing 25,000 h.p. The company is also authorised to construct transmission lines to bring power to La Paz. Installation work is expected to take about twelve months.—*Reuter's Trade Service* (La Paz).

Builth Wells.—PURCHASE OF UNDERTAKING.—Builth Wells Electric Supply Co., Ltd., has been purchased by the Shropshire, Worcestershire, and Staffordshire Electric Power Co.

Canada.—ELECTRICAL DEVELOPMENTS.—According to *Power*, the annual report of the British Columbia Power Corporation, issued recently, forecasts an expenditure of $50,000,000 on power development within the next six years. This sum will be spent largely on development of Bridge River, Ruskin and Campbell River hydro-electric projects. The total capacity of Bridge River is estimated in the report as 750,000 h.p. In the Ruskin development the ultimate capacity is estimated at 188,000 h.p., and will cost $20,000,000. About 47,000 h.p. will be brought into service in about a year.

HYDRO-ELECTRIC SCHEME.—The general contract of the Powell River Company for the development of 18,000 h.p. on the Lois River has been awarded to Stuart, Cameron & Co., Vancouver. The cost of the entire scheme is estimated at $6,000,000.

Continental.—PORTUGAL.—As a protest against an increase of 20 per cent. in the cost of electricity, most shops in Lisbon for the last month have not illuminated their windows at night, while others have used candles and oil lamps after dark. As a result of this boycott, a meeting was held between representatives of the Gas and Electricity Company and representatives of trade and commerce, and an arrangement was reached whereby the company will allow a 50 per cent. reduction in charges to commercial houses for any consumption of electricity exceeding a certain minimum. The shopkeepers have now reverted to their usual lighting arrangements.—*Reuter.*

SWEDEN.—In a recent issue of the bi-weekly "Commerce Reports," published by the Swedish Board of Trade (Kommerskollegium), Mr. Viking Kaellström gives an interesting summary of the production and consumption of electric power in Sweden during 1928. The report shows that the total production of electric power has increased from 1,449 million kWh in 1913 to 4,410 million kWh in 1928, so that during the past 15 years the total production has been more than trebled. During the last five years the increase was 48 per cent. The work of enlarging old plant or building new stations in hand on January 1st, 1929, represented a total capacity of about 145,000 h.p. Amongst the consumers of power during 1928 the big industries came first, with a total consumption of 2,270 million kWh, while for the small industries, farming, household, and lighting purposes the consumption was 490 million kWh. The aggregate gross income in Sweden from the sale of electric power during the past year was 126 million kronor (£7,000,000), as against 120 million kronor (£6,670,000) in 1927. Of this, 21.6 million kronor (£1,200,000) went to the Government power plants, 61.9 millions (£3,440,000) to municipal, and 42.5 millions (£2,350,000) to other plants. Sweden's total resources of water power, according to a recent estimate, amount to between 4 and 6 million h.p. Of this, about three million h.p. will probably be required and exploited during the next 50 years, and about 1,300,000 h.p. is at present fully ultilised.

FRANCE.—With the object of utilising the water power resources of the River Rhone, a company is being formed in Lyons with the title of La Compagnie Nationale du Rhone. The General Council of the Department of the Isère has resolved to take a large financial interest in the new undertaking.

ITALY.—According to a recent return, the installed capacity of hydro-electric generating stations in Italy increased during the twelve months ended July last from 2,602,000 kW to 2,878,000 kW. During the same period there was an increase in the capacity of steam, gas, and oil-operated stations from 577,000 to 655,000 kW.

Hereford.—TRANSFER OF UNDERTAKING OPPOSED.—According to the *Birmingham Post*, a campaign is being conducted by the Hereford Labour Party and Trades and Labour Council against the proposal of the City Council to transfer the municipal electricity undertaking to the Shropshire, Worcestershire, and Staffordshire Electric Power Company, which proposes to supply the greater part of electricity used in Herefordshire from its station at Stourport. A petition to the Electricity Commissioners is being organised, opposing the transfer on the ground that (*a*) the Hereford electricity works can be made to pay under improved management; (*b*) a public inquiry into the proposed transfer should be held; (*c*) the City Council has not consulted the citizens; (*d*) the transference may result in the price of electricity being increased; (*e*) members of the City Council may be interested financially in the transfer; and (*f*) they have special information which could be given at a public inquiry.

Holywell.—ELECTRICITY SUPPLY EXTENSIONS.—The Electricity Distribution of North Wales & District, Ltd., has notified the Rural District Council of its intention to give a supply of electricity to the villages of Halkyn and Pentre Halkyn.

India.—CALCUTTA.—As a result of the rapid growth in the demand for electrical energy on the Howrah side of the Hooghly river, the Calcutta Electric Supply Corporation, Ltd., has been faced with the question of choosing between erecting a new generating station on the right bank of the river, or of devising some secure means of carrying cables across the river from the Southern power station. In a notice issued to shareholders last week the Corporation states that it is proposed to construct a tunnel under the river to take all necessary cables across to the right bank. This tunnel, which is the first of its kind in the East, will be at a depth of 93 ft. below the surface. Its length will be nearly 600 yards and its internal diameter 6 ft. It is expected that the work will be completed by midsummer, 1931.

Irish Free State.—DUNDALK.—The proposal that with the coming of the Shannon electricity scheme the Dundalk power station, which has been operating under municipal control for the past 18 years, should be abolished, is being strongly opposed by the Urban District Council. A scheme has been submitted to the Electricity Supply Board providing for the conversion of the Shannon supply into d.c. for the supply of the town and district at a cost of £20,000. The Council, in approving the schemes prepared by its engineer, asks the Electricity Board to inquire whether expediency does not outweigh considerations of strict economy in this particular case.

Lathom and Burscough.—SPECIAL ORDER.—The Urban District Council has decided to make application to the Electricity Commissioners for powers to supply electricity in the district of Lathom and Burscough.

London.—STOKE NEWINGTON.—Experimental high candle-power electric and gas lamps of various types, with and without refractors, have been erected in Seven Sisters Road between Manor House and Amhurst Park. The Borough Council Highways Committee has given careful consideration to these and to the comparative cost and efficiency of gas and electricity for street lighting. A report has been prepared by the borough engineer, embodying a scheme recommended by him for re-lighting these roads by means of 500-watt electric or 900-c.p. gas lamps, spaced at intervals of 180 ft. After full consideration of the matter the Committee has come to the conclusion that it will be advisable, and in the interests of efficiency, if gas and electric lamps as described above are erected alternately in these main thoroughfares.

The Borough Council Electricity Committee is to extend mains at cost of £541 and install free wiring at a cost of £829.

HAMMERSMITH.—The Borough Council has received sanction to the borrowing of £9,967 for mains extensions.

WANDSWORTH.—The Borough Council Highways Committee is to improve street lighting in Clapham at a cost of £1,143.

ST. PANCRAS.—The Borough Council Electricity and Public Lighting Committee recommends that the standing charge for electricity under the "One-meter-system" be reduced from £16 to £12 per kW.

STREET LIGHTING.—The L.C.C. Highways Committee recommends the approval of the standard price of 2d. per kWh fixed by the South Metropolitan Electric Light and Power Co., Ltd., for street lighting.

New Zealand.—HYDRO-ELECTRIC SCHEME.—Mr. H. P. Gibbs, a British hydro-electric engineer, representing a nitrogen-producing organisation which holds an option on a large power scheme at Lake Manapouri, near the fiords of the south-west coast, has returned to Dunedin after investigating the proposal. It is understood that the scheme involves the construction of six miles of tunnelling in order to obtain power sufficient to generate 250,000 h.p. The total cost of the scheme, it is understood, would amount to £6,000,000.—*Reuter* (Wellington).

HYDRO-ELECTRIC SCHEME INAUGURATED.—The Lake Waikaremoana hydro-electric scheme, which is the last big link in the North Island hydro-electric system, was officially opened on November 20th by the Governor-General, Sir Charles Fergusson.—*Reuter* (Wellington).

Preston.—LOAN.—The Corporation Electricity Committee has recommended that application be made for sanction to a loan of £57,079, to be spent on the river wall, buildings and plant. The sum of £8,634 is required for the transmission line and sub-station for Blackburn, and £12,306 for the first part of the Blackpool line.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

LONDON.—*Stepney.*—The secondary charge for lighting and domestic supplies: from 1d. to ½d. per kWh. Public lighting: from 1d. to ½d. per kWh, with no discount.

WELWYN GARDEN CITY.—Two-part tariff "unit" winter charge: first 40 kWh, per quarter, 3d. per kWh, and 1d. per kWh for all further energy consumed. Two-part tariff "unit" summer charge: first 20 kWh per quarter, 3d. per kWh, next 180 kWh 1d., above 200 kWh, ½d. The two-part tariff fixed charges have also been reduced. Lighting flat rate: from 10d. to 8d. per kWh. Flat rate prepayment consumers: a refund of 1½d. in the 1s.

Southend-on-Sea.—BULK SUPPLY.—The Electricity Commissioners have approved the agreement between the Corporation and the County of London Electric Supply Co., Ltd., for a supply of electricity in bulk.

Stirling.—NEW ELECTRICITY CHARGES.—The Town Council has adopted the following scale of charges for general consumers: First 3,000 kWh, 4d. per kWh; second 3,000 kWh, 3½d.; third 3,000 kWh, 3d.; all over 9,000 kWh, 2d. per kWh.

United States.—ELECTRICAL DEVELOPMENTS.—The Washington Electric Company, Seattle, Wash., a subsidiary of the Puget Sound Power & Light Company, Seattle, has been granted a licence by the Federal Water Power Commission for a hydro-electric scheme at Rock Island, on the Columbia River, near Wenatchee, with an initial capacity of 60,000 kW. This licence, says *Power*, enables the company to proceed with a scheme that will cost from $10,000,000 to $12,000,000 for the first unit, and will ultimately have a capacity of 180,000 kW. The company hopes to complete the first unit by 1933.

The Georgia Power Company has completed preliminary plans and hopes to start work immediately on a new 60,000-h.p. hydro-electric development on the Oconee river at Furman Shoals, four miles north of Milledgeville, Ga.

West Lancashire.—ELECTRICITY SCHEME.—The Rural District Council is applying for sanction to a loan of £22,625 in connection with future developments in the electricity scheme for the parishes of Aughton, Maghull and Lydiate.

Worcester.—OVERHEAD LINE.—The City Council has authorised the construction of an overhead line connection to the power line at Kenswick of the Shropshire, Worcestershire and Staffordshire Power Co. The cost of this connecting line is estimated at £20,730, of which it is expected the company will contribute approximately one half.

Tramway and Railway Notes.

Australia.—SYDNEY.—Steady progress is being made with Sydney's underground electric railway system, which is to be opened for traffic at the same time as the Sydney Harbour bridge. The section from the Central Station to St. James' Square, which has been in operation for some time, is now being extended to Circular Quay and will link up with the sections between the south side of the Harbour Bridge and Central Station. The greater part of the tunnelling work over the whole route has been completed, and concreting is well advanced. The station details at the Town Hall and Wynyard Square are well in hand, but work on those at Circular Quay has been in suspense pending the choice by the Government of rival designs and sites. This choice has now been practically agreed upon, and the work will be proceeded with almost immediately. The system will eventually be connected with a railway service to the eastern suburbs, the prospective junction being at St. James' Square. Preliminary investigations on the proposed route of this line are now in progress.—*Reuter* (Sydney).

Barnsley.—PROPOSED TRAMWAY ABANDONMENT.—The Yorkshire Traction Co., Ltd., is promoting a Bill in Parliament for powers to abandon the tramway system and substitute motor-'buses.

Continental.—FRANCE.—Plans were drawn up some time ago for the electrification of the P.L.M. railway, but as the cost will be very considerable the programme is consequently to be carried out section by section. The work of electrifying the eighty-four miles between Culoz and Modane is to be carried out shortly. Power will be provided by seven power stations which will utilise the water power from the Arly, the Doron and the Beaufort rivers. Only a small proportion of the energy generated at these stations will be used by the railway, the rest being distributed over the surrounding district. The third rail system will be employed mainly, overhead traction being resorted to only in the larger stations.—*Reuter* (Paris).

RUSSIA.—The work of electrification having been completed, electric trains are now being run on the local railway between Moscow and Mytischtsche, a distance of about 11 miles.

Dearne Valley.—RAILLESS CARS.—As the result of the decision of the Doncaster and Barnsley local authorities to abandon the tramways in favour of railless cars, the Dearne Valley Light Railways has decided to promote a Bill in Parliament to enable it to substitute railless cars for its tramway system, which was completed about ten years ago at a cost of £250,000.

India.—BOMBAY.—The Bombay Electric Supply and Tramways Co., Ltd., is to extend the tramway system along Sudenham Road from its junction with Bhendi Bazar to the junction of Palton Hornby Roads.

Japan.—RAILWAY VOLTAGE STANDARDISATION.—The I.G.R. is considering the standardisation of the voltage used on the Japanese electric railways at either 750 or 1,500 volts.

Manchester.—UNDERGROUND RAILWAY SCHEME.—The Corporation Underground Railways Committee is to ask the City Council at its January meeting for permission to apply to the Government for a grant in respect of the city's tube railway scheme, the cost of which is estimated at £11,000,000.

United States.—RAILWAY ELECTRIFICATION.—One hundred and fifty electric locomotives, more powerful than any yet constructed and of such speed that the scheduled time between the line of industrial cities in the north-east will be reduced by 20 per cent. or more, are to be ordered by the Pennsylvania Railroad as part of a comprehensive electrification scheme soon to be put into operation. The New York correspondent of *The Times* states that these locomotives, the cost of which is estimated at $16,000,000 (£3,200,000), will be used in pairs, giving 6,000 h.p. and a maximum speed of more than 90 miles an hour. They will serve the line from New York through Trenton, Philadelphia, and Baltimore to Washington, and will accomplish the journey from New York to Washington in four hours, at an average speed of nearly 60 m.p.h. The new service is expected to eliminate automobile competition and also the necessity of the railroad extending its air service operations between New York and Washington in the near future.

Telegraph and Telephone Notes.

Brazil.—SHORT-WAVE RADIO STATIONS.—The Companhia Auxiliar Radio Emissora do Brazil will shortly commence work on the installation of radio-telegraph stations at Fernando-de-Noronha, destined to become the most important air-port in Brazil; Natal, Recifé (Pernambuco), Maceao, Bahia, Caracellas, Victoria, Rio de Janeiro, Santos, Florianopolis, Pelotas, and Puerto Alegre. It is also proposed to install short-wave stations at a number of points not already provided with radio-telegraph stations. The Minister of Transport and Communication has expressed his approval of the entire plan.—*Reuter's Trade Service* (Rio de Janeiro).

AUTOMATIC TELEPHONY. — The Companhia Mineira de Electricidade has obtained a concession for a system of automatic telephony at Juiz de Fora (population 120,000), the third most important manufacturing centre in Brazil. A contract has also been concluded between that company and the Swedish L. M. Ericsson Co. for most of the material, including apparatus for 1,500 city and 60 interurban equipments.—*Reuter's Trade Service* (Bello Horizonte).

Italy.—VATICAN CITY.—The Vatican City's telegraph office was opened to the public on November 25th, providing a direct service to and from the Pope's little dominion.

South Africa.—RADIO-TELEPHONY.—It is understood that recently experiments in wireless telephony have been carried out between the British and South African Post Offices. Great Britain has spoken to Pretoria with fairly satisfactory results, but Pretoria has not yet spoken to Great Britain.

The experiments are being made with short waves, and two-way communication has, of course, already been satisfactorily carried out with Australia.

The Telephone Service.—PROPOSAL FOR SEPARATE AUTHORITY.—At the instance of the Post and Telegraph and London Telephone Advisory Committee, the Council of the London Chamber of Commerce has decided to ask the Government to institute an inquiry into the advisability of establishing an independent statutory authority to administer the internal telephone and telegraph services of the country. The Telephone Development Association favours such an inquiry, and is now considering the draft of a scheme designed to meet the special requirements of telephone administration in Great Britain. If, in the meantime, an official inquiry were undertaken by the Government, the Association would welcome the opportunity of putting forward its own recommendations.

SHIP-SHORE SERVICE.—The first telephone service on the Tyne linking up ships with the shore was opened on Novem-

ber 22nd. Recently the Tyne Improvement Commission decided to install telephones at its seven staiths at Whitehill Point, North Shields, with extensions to the vessels lying at the loading berths.

Transatlantic Telegraphy.—Cable Interruptions.—The severe earthquake that shook the North-Eastern Atlantic coast on November 18th interfered considerably with the submarine telegraph cables. It has been reported that nearly half of the score or so of cable lines between this country and North America was broken by the upheaval of the ocean bed in the region of Nova Scotia, and several were apparently broken at more than one point. This is believed to be the first time in the history of the Atlantic cables that they have been injured by an earthquake. The Western Union Telegraph Company sent out two repair ships, the *Lord Kelvin* and the *Cyrus Field*, from Halifax, Nova Scotia. The company also chartered the *Dominia*, the largest cable-laying ship in the world, which is owned by the Telegraph Construction and Maintenance Company, of Greenwich. The Western Union Company maintains nine cables across the Atlantic, with a tenth which ends at the Azores, and three of the nine were broken.

The Commercial Cable Company sent out the *John W. Mackay*, one of the company's two repair ships, from Halifax, and the other was recalled from South America, through the Panama Canal. The company also commissioned the *Faraday*, of London, to co-operate in the work. Four out of the company's six cables between New York and Nova Scotia were damaged off the coast of Nova Scotia; and three of the broken cables extend across the Atlantic. Both the Imperial cables from North America were stated by Imperial and International Communications to have been out of action.

The mishap appears to have roughly halved the normal telegraph facilities, causing considerable delay to the cheaper services, but little to urgent messages. Communication was maintained by diverting traffic to the radio services and alternative cable routes.

From France it was reported that severe storms in the Atlantic off Brest broke the cable between Brest and Casablanca. The British cable ship *Telconia* went out on November 19th in an endeavour to repair the damage, but was obliged to put into Ushant, owing to the heavy seas.

Venezuela.—Wireless Telegraphy.—A message from Caracas says that it has been decided to add a number of new short-wave radio-telegraph stations to amplify the services at Caracas, Maracay, and Marquetia. Eventually the radio-telegraph service will be extended to many other points in Venezuela. It is stated that the revenue from radiograms during the past fiscal year (958,000 bolivars) was four times that of the previous year, and that the general expenses of the radio-telegraph service were covered more than twice over. —*Reuter's Trade Service.*

Radio Notes.

Algiers.—New Broadcasting Station.—The Governor-General of Algeria, North Africa, opened a high-power broadcasting station at Arba, in the neighbourhood of Algiers, on November 19th.—*Reuter's* (Algiers.)

Holland.—Relay Stations.—The Catholic Radio Society (K.R.O.) and the Netherlands Christian Radio Society (N.C.R.V.), founders and principal controllers of the Huizen station, have applied to the Minister of Waterstaat for permission to erect a number of local stations in various parts of the country for relaying the Huizen programmes, says *World-Radio*, which explains that it is proposed to make use of the "Gleichwellen" system of common waves.

The Broadcasting Union.—Recent Meeting.—The International Broadcasting Union, of which Vice-Admiral Carpendale, of the British Broadcasting Corporation, is president, held at Barcelona, Spain, last week, a series of meetings of its council and various commissions, which were attended not only by members of the Union, but also by a number of official delegates of the various European postal and telegraph administrations, the director of the Berne Bureau of the International Telegraph Union, a representative of the secretariat of the League of Nations, and by representatives of the International Red Cross and League of Red Cross Societies. According to *The Times*, the council adopted the report of the technical commission dealing with the application of the Prague, European Plan of wave-lengths, which recommends a more rigorous use of the means the Union has at its disposal for keeping stations strictly to their allotted wave-lengths, and some procedure for reducing interference due to faulty control of modulation. The Union will study, in association with postal and telegraph administrations, through the medium of the Berne Bureau, a number of technical problems which require examination before the next World Conference of the International Telegraph Union at Madrid in 1932. Other subjects dealt with were international exchanges of programmes through the medium of the new international telephone circuits, and a scheme for relays from Geneva during the annual assemblies of the League of Nations. Resolutions were also adopted for co-operation with the new official First Aid Union (Union Internationale des Secours).

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—Melbourne.—Posts and Telegraph Department. January 7th. Telephone hand sets. (B.X. 5823.)* Contact pressure testers. (B.X. 5821.)*

January 14th. Ringing motor-generator sets for automatic telephone exchanges. (B.X. 5839.)* Telephone indicators. (B.X. 5822.)*

January 28th. Induction coils and register plates. (B.X. 5899.)*

January 13th. State Electricity Commission of Victoria. 2,200-V switchgear and accessories. (B.X. 5827.)*

Belgium.—December 11th. Post and Telegraph authorities, La Salle Madeleine, Brussels. Supply and laying telephone cables between Mouscron, Wevelghem, and Dottignies, and between Ostend and La Panne. Particulars (Cahier des Charges Special No. 3452) for 18 francs.

Birmingham.—December 4th. Board of Guardians. Electrical work at Western House. Mr. C. P. Beech, Clerk to the Guardians, Union Offices, Edmund Street, Birmingham. (Deposit £2 2s.)

Cheadle and Gatley.—Electricity Department. December 10th. E.h.p. and m.p. cable extensions. Specifications (Contract No. 48) (£2 2s.) from Mr. R. W. Willis, electrical engineer and manager, 37, High Street, Cheadle, Cheshire.

Clydebank.—Town Council. Electric lighting installations in connection with the erection of 320 houses (deposit £1). Mr. J. W. Johnston, town clerk, Municipal Buildings, Clydebank.

Egypt.—Cairo.—December 28th. Ministry of Public Works. Electric generating and pumping sets for Mankabad Barracks. (B.X. 5842.)*

February 1st. Ministry of the Interior. Centrifugal well pump and direct coupled electric motor with piping and accessories. (A.X. 8811.)*

Hull.—December 19th. Electricity Department. Supply of electricity meters. (November 22nd.)

Irish Free State.—Dublin.—December 7th. Department of Industry and Commerce. New pumping plant, in connection with Shannon power development. Specifications (£1 1s.) from Chief Engineer, 88, Merrion Square, Dublin.

Waterford.—Town Council. December 2nd. Electric wiring installation at the town hall and municipal buildings. Specifications (deposit £2 2s.) from Messrs. McEntee and O'Kelly, consulting engineers, 23, Upper O'Connell Street, Dublin.

Kirkcaldy.—Fife.—December 18th. Education Authority. Electric and heating works, at additions to St. Agatha's R.C. school, Methil, and Bell-Baxter school, Cupar. Schedules (deposit £1 1s. each) from Mr. E. Sandilands, architect and master of works, Education Offices, Kirkcaldy.

London.—Stepney.—December 5th. Board of Guardians. Installation of wireless receiving apparatus at each of its three hospitals. The apparatus required will include 1,159 headphones and 24 loud-speakers. (November 15th.)

Central Electricity Board.—December 21st. Supply, delivery and erection of 132,000-V transformers for the Mid-East England Electricity Scheme, 1929. (November 22nd.)

January 6th. Supply, delivery, and erection of 132-kV overhead transmission lines (special crossings and high spans),

for the North-West England and North Wales Electricity Scheme, 1928. (See this issue.)

WANDSWORTH.—December 11th. Union Guardians. Supply of 18 electric sterilisers. (See this issue).

Manchester.—December 13th. Electricity Committee. Electrically-propelled tower-ladder vehicles. (See this issue).

December 10th. Delivery and placing into position at the Barton power station of 12 single-phase feeder reactors, and the supply and placing into position in the Manchester area of 125, 250, 500, 750, 1,000 kVA 6,400-400 V 3-phase, oil-immersed, self-cooled transformers. (See this issue.)

December 17th. Supply and erection of one 6,600-V sheet-steel type transformer kiosk and switchgear. (See this issue.)

Millom.—December 20th. Urban District Council. E.h.p. and l.p. cables, pillar box, &c., and e.h.p. and l.p. switchgear, transformer, &c., for the Haverigg extension scheme.. (November 22nd.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. January 13th. Four point jacks. (B.X. 5840.)*

January 16th. Telephone switchboard plug covers. (B.X. 5879.)*

Public Works Department. January 14th. Two air compressors and two electric motors. (A.X. 8784.)*

January 28th. Three 50-kW, oil-immersed, circuit breakers for Arapuni. (B.X. 5878.)*

Rochdale.—December 3rd. Town Council. Electric lighting and power installation for 104 houses, Spotland Estate.—Particulars from Borough Surveyor, Town Hall.

South Africa.—PRETORIA.—December 27th. Posts and Telegraph Department. Telegraph material. (A.X. 8734.)*

BLOEMFONTEIN.—January 10th. Electricity Supply Department. Automatic electric traffic signals. (B.X. 5887.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Bexhill.—Electricity Committee. Recommended:—
Cable for six months.—Enfield Cable Works, Ltd.
Meters (£1,057).—Edison Swan Electric Co., Ltd.
Prepayment meters (£34).—Chamberlain & Hookham, Ltd.

Cape Town.—Electricity Committee. Recommended:—
Cable.—Siemens Bros. & Co., Ltd. (£33,296); British General Electric Co., Ltd. (£1,676); A.E.G. Engineering Co. (S.A.), Ltd. (£5,249); British Insulated Cables, Ltd. (£902).

Chopwell.—Co. DURHAM.
Wiring in screwed conduit 635 houses, with street mains, house mains, &c.—R. W. Leek & Co.

Croydon.—Electricity Committee. Recommended:—
Electrical work in connection with linking switchrooms with new switch-house (£1,108.)—English Electric Co., Ltd.
Switchroom equipment (£19,015).—Metropolitan-Vickers Electrical Co., Ltd.
Works auxiliary switchboard (£1,728).—Ferguson Pailin, Ltd. (Recommended.)

Glasgow.—Transport Committee.
Installation of the boiler plant in connection with the reconditioning scheme at Pinkston power station, six boilers (£90,327).—John Thompson (Water Tube Boilers), Ltd. (Recommended.)

Government Contracts.—The following Government contracts were placed during October, 1929:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.
Motor-alternators.—W. Mackie & Co., Ltd.
Batteries.—Ever-Ready Co., Ltd.
Battery gear.—Tudor Accumulator Co., Ltd.
Rotary blowers.—Reavell & Co., Ltd.
Distributing boards.—L. Weekes (Luton), Ltd.; Park Royal Engineering Co., Ltd.; Veritys, Ltd.; McGeoch & Co., Ltd.
Electric cable.—Croydon Cable Works, Ltd.
W./t. coils.—Marconi's Wireless Telegraph Co., Ltd.; H. W. Sullivan, Ltd.
W./t. condensers.—Dubilier Condenser Co. (1925), Ltd.
Electrical equipment for cranes.—Wharton Crane and Hoist Co., Ltd.
Electric hot cupboards.—Credenda Conduits Co., Ltd.
Reversing motor-generators and boosters.—Haslam and Newton, Ltd.; Small Electric Motors, Ltd.
Electrical indicators.—Dobbie, McInnes & Clyde, Ltd.
Electric light installation.—G. E. Taylor & Co.
Electric lamps.—General Electric Co., Ltd.
W./t. panels.—H. W. Sullivan, Ltd.
Copper bars and bronze sheets, bars, &c.—T. Bolton and Sons, Ltd.; Birmingham Battery & Metal Co., Ltd.; Bull's Metal & Melloid Co., Ltd.; Delta Metal Co., Ltd.; Elliott's Metal Co., Ltd.; McKechnie Bros., Ltd.; P. H. Muntz & Co., Ltd.; Manganese Bronze & Brass Co., Ltd.; W. Roberts & Co.; Garston (1928), Ltd.
Starters and resistances.—Watford Electric & Manufacturing Co., Ltd.; Rheostatic Co., Ltd.
W./t. transmitters.—Marconi's Wireless Telegraph Co., Ltd.; Gambrell Bros., Ltd.; H. W. Sullivan, Ltd.
Tuners, amplifiers, receivers, &c.—Radio Instruments, Ltd.; The Plessey Co., Ltd.; Marconi's Wireless Telegraph Co., Ltd.; H. W. Sullivan, Ltd.; Johnson and Phillips, Ltd.
Wireless valves.—Mullard Radio Valve Co., Ltd.
Enamelled copper wire.—British Insulated Cables, Ltd.; London Electric Wire Co. & Smiths, Ltd.

WAR OFFICE.
Electric lamps.—General Electric Co., Ltd.; Edison Swan Electric Co., Ltd.
Generating sets.—Douglas Motors, Ltd.
W./t. valves.—General Electric Co., Ltd.
Electric lighting installations.—Holywood: W. Coates and Sons, Ltd.; Dunbar Barracks: Grindlay Ross & Co., Ltd.

AIR MINISTRY.
Battery charging panels.—Harland Engineering Co., Ltd.
Diesel generating set (Calafrana).—Mirrlees, Bickerton and Day, Ltd.
Cockpit lamps.—Johnson & Phillips, Ltd.
Receivers.—Johnson & Phillips, Ltd.
Transmitters and spares.—Johnson & Phillips, Ltd.
Wavemeters.—H. W. Sullivan, Ltd.

POST OFFICE.
Telegraph apparatus.—Creed & Co., Ltd.
Telephone apparatus.—Automatic Telephone Manufacturing Co., Ltd.; Ericsson Telephones, Ltd.; International Electric Co., Ltd.; B. W. Johnson; Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. and Co., Ltd.; Standard Telephones & Cables, Ltd.
Protective apparatus.—Automatic Telephone Manufacturing Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.
Wireless apparatus.—Standard Telephones & Cables, Ltd.
Cable (various).—B. I. Cables, Ltd.; Callender's Cable and Construction Co., Ltd.; Enfield Cable Works, Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones and Cables, Ltd.; Union Cable Co., Ltd.
Joint box castings.—General Foundry & Engineering Co., Ltd.; Grahamston Iron Co., Ltd.; United Steel Companies, Ltd. (Thomas Butlin & Co. Branch).
Secondary cells.—D.P. Battery Co., Ltd.
Loading coils.—General Electric Co., Ltd.
Moving-coil condensers.—General Electric Co., Ltd.
Dynamotors.—W. Jones & Co.
Earpieces.—North British Rubber Co., Ltd.
Electric light fittings.—Stevens & Williams, Ltd.
Electric handlamps.—Veritys, Ltd.
Wood troughing.—Armstrong, Addison & Co., Ltd.
Electric trucks.—Greenwood & Batley, Ltd.
Bronze wire.—British Insulated Cables, Ltd.
Flameproof wire.—Enfield Cable Works, Ltd.; Macintosh Cable Co., Ltd.; Reliance Electrical Wire Co., Ltd.
Air compressors.—Grimsby H.P.O.: Lacy-Hulbert and Co., Ltd.
Batteries (Synthetic, Ammonia and Nitrates automatic P.B.X.—Billingham): Premier Accumulator Co., Ltd.
Manufacture, supply, laying and jointing cable.—Anglo-Belgian, 1930, land and submarine: Siemens Bros. and Co., Ltd.; Bradford-Huddersfield: W. T. Henley's Telegraph Works Co., Ltd.
Electrical equipment.—Acorn Telephone Exchange W. substation: A. Reyrolle & Co., Ltd.
Telephone exchange equipment.—Greenwich, Gerrard, Harrow, Wanstead, Kingston-on-Thames, and Regent: Automatic Telephone Manufacturing Co., Ltd. Merrylee (Glasgow): General Electric Co., Ltd. Sub-contractors: Crompton Parkinson, Ltd., for motor-generators and ringing machines; D.P. Battery Co., Ltd., for batteries. Morecambe: Standard Telephones and Cables, Ltd. Sub-contractors: Electric Construction Co., Ltd., for motor-generator; Crompton Parkinson, Ltd., for ringing machines; Chloride Electrical Storage Co., Ltd., for batteries.

CROWN AGENTS FOR THE COLONIES.
Cables.—Siemens Bros. & Co., Ltd.; Callender's Cable and Construction Co., Ltd.
Distribution line materials.—Bullers, Ltd.
Electric lighting plant.—General Electric Co., Ltd.
Lightning guards.—Muirhead & Co., Ltd.
Spares for Lux cells.—Chloride Electrical Storage Co., Ltd.
Static transformers.—Brush Electrical Engineering Co., Ltd.
Switchboard modifications.—British Thomson-Houston Co., Ltd.
Switchgear.—Electric Control, Ltd.
Telephone apparatus.—Standard Telephones & Cables, Ltd.
Telephones.—Ericsson Telephones, Ltd.
Wireless apparatus.—Marconi's Wireless Telegraph Co., Ltd.

H.M. OFFICE OF WORKS.
Steam generating set, &c.—Greenwood & Batley, Ltd.

Grimsby.—Corporation. Accepted:—
L.p. cables for 12 months.—Metropolitan Electric Cable and Construction Co., Ltd.

Irish Free State.—Dublin.—The following is a list of contracts placed by the Controller of Stores, Department of Posts and Telegraphs, during October, 1929:—
Batteries.—Edison Swan Electric Co., Ltd.
Bells (telephones).—Ericsson Telephones, Ltd.
Insulators.—Geerz Bros. and Kellie (Ireland), Ltd.
Poles.—McCartan Bros.; T. and C. Martin, Ltd.; Eustace and Co., Ltd.
Transmitters.—Ericsson Telephones, Ltd.
Wire (copper).—E. and E. Kaye, Ltd.
Wire (flameproof).—F. Routledge.
Valves (radio).—Standard Telephones & Cables, Ltd.

London.—Stepney.—Electricity Supply Committee. Accepted:—
Twenty-two circuit breakers (£107).—Whipp & Bourne.

Upton-on-Severn.—Rural Council. Accepted:—
Installing electric light at Council houses (£6 3s. each) for parlour type, and (£4 12s. each) for non-parlour type.—Mr. Addyman, Worcester.

Forthcoming Events.

Cardiff Engineering Exhibition.—November 27th to December 7th. Drill Hall, Cardiff.

Electrical Power Engineers' Association (London Central Section).—Friday, November 29th. Slater's Restaurant, High Holborn, W.C. Annual dinner.

Electrical Association for Women (Bristol and District Branch).—Friday, November 29th. Fortt's Restaurant, Bristol, 8 p.m.—1 p.m. Whist drive and dance.

Institution of Mechanical Engineers.—Friday, November 29th. Institution, Storey's Gate, S.W. Debate on "The Registration of Reliable Tests of Power Plant Machinery." Opened by Mr. R. H. Parsons.

Junior Institution of Engineers.—Friday, November 29th. 39, Victoria Street, S.W. 7.30 p.m. "Modern Welding Systems and Applications." Mr. W. C. Freeman.

Institute of Marine Engineers.—Friday, November 29th. Hotel Victoria, Northumberland Avenue, W.C.2. 7 p.m. Annual conversazione.

Association of Supervising Electrical Engineers.—Tuesday, December 3rd. Magnet House, Kingsway, W.C., 7.15 p.m. "Recent Development in Lighting Accessories, with Special Reference to the Increasing Use of Insulated Material in place of Metal." Mr. F. G. France.

Television Society.—Tuesday, December 3rd. Engineers' Club, W. 8 p.m. "Television: Some Suggested Schemes." Mr. E. G. Lewin.

Edinburgh Electrical Society.—Wednesday, December 4th. 16, Royal Terrace, Edinburgh. "Static Condensers." Mr. H. Ferguson.

British Institute of Radiology (incorporated with the Röntgen Society).—December 4th, 5th and 6th. Exhibition and special meetings.

Batti-Wallahs' Society.—Thursday, December 5th. Hotel Cecil, Strand, W.C. 12.30 for 1 p.m. Luncheon. Address by Mr. V. Watlington.

Electrical Society of Glasgow.—Thursday, December 5th. Visit to Royal Technical College, Glasgow, Electrical Engineering Department.

Institution of Electrical Engineers.—Thursday, December 5th. Institution, London, W.C. 6 p.m. "Surges and Overvoltage Phenomena on Transmission Lines due to Lightning and Switching Disturbances." Dr. H. Norinder.

(Meter and Instrument Section).—Friday, December 6th. Institution, London, W.C. 7 p.m. "Alternating-current Potentiometers and their Applications." Dr. C. V. Drysdale.

(Wireless Section).—Wednesday, December 4th. Institution. 6 p.m. "Naval Wireless Telegraphy Communications." Mr. G. Shearing and Capt. J. W. S. Dorling, R.N.

(North-Eastern Centre).—Tuesday, December 3rd. Annual dinner.

(Scottish Centre).—Tuesday, December 3rd. North British Station Hotel, Edinburgh. 7 p.m. Informal meeting. "Engineering from the Cape to Kenya." Prof. Baily.

(South Midland Centre).—Monday, December 2nd. University, Birmingham. 7 p.m. "The Modern Use of Pulverised Fuel in Power Stations." Mr. R. A. Chattock.

(East Midland Sub-Centre).—Wednesday, December 4th. Technical College, Derby. 6.45 p.m. "Electric Traction." Lieut.-Col. H. E. O'Brien.

(Scottish Students' Section).—Wednesday, December 4th. Glasgow. Ordinary meeting.

(North-Eastern Centre, Students' Section).—Friday, December 6th. Armstrong College, Newcastle-on-Tyne. Ordinary meeting.

(North-Western Students' Section).—Tuesday, December 3rd. Engineers' Club, Manchester. 7.15 p.m. "Overhead Line Work." Mr. F. J. R. Baldwin.

West Wales (Swansea) Sub-Centre.—Friday, November 29th. Corporation Showrooms, Swansea. 6 p.m. "Paris and the Pyrenees: Notes on some of the Technical Features of the I.E.E. 1929 visit." Mr. R. Borlase Matthews.

(North Midland Students' Section).—Tuesday, December 3rd. Hotel Metropole, Leeds, 7.20 p.m. "The Oil Circuit-Breaker." Mr. C. S. T. Paul.

Nottingham Society of Engineers.—Friday, December 6th. Annual dinner.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following:—

Foot-warming apparatus for chiropodists' use. It is heated by ordinary wire elements of about 200 watts capacity, and the temperature obtained (by thermometer, which is visible from the outside of the box) is about 250 F.

Notes.

The New Health Exhibition.

During the short period of its existence the New Health Society has conferred considerable benefit upon the nation by its quietly persistent crusade for the observance of the few sane and simple rules of life that make all the difference between good and indifferent health. At the second of the annual exhibitions held under the auspices of the Society (New Horticultural Hall, Westminster, November 15th to 22nd) one of the largest displays was that of the German Health Society, including what has been called "The Transparent Man," a really interesting and instructive series of transparencies of the body prepared in a novel manner to show the organs and their functions, displayed in a way similar to X-ray photograph viewing benches with light beneath. Amongst the wax models were some illustrating burns sustained from electric currents. Other exhibitors included:—

C.C.A. (Vacuum Cleaners), Ltd., cleaners and floor polishers, including a combination model that sweeps, cleans, and polishes at the same time, demonstrated to show the removal of dirt from the floor beneath (and drawn through) a carpet.

Dowsing Radiant Heat Co., Ltd., light and heat apparatus for medical treatment, bed-warmers, sterilisers, vibrators, water heaters, high-frequency machines, &c.

Edison Swan Electric Co., Ltd., electric refrigerators.

General Acoustics, Ltd., electrical and other aids for the deaf.

Health Devices, Ltd., motor-driven vibrating exerciser and reducer.

Bedington, Liddiatt & Co., Ltd., "Savage" motor-driven exerciser.

Tellus Super Vacuum Cleaner, Ltd., a machine that dispenses with a dust bag in favour of a steel container; moreover, it can be used as a blower and also for spraying liquids, such as disinfectants, for lacquering furniture, garden spraying, &c.

Appointments Vacant.

Meter repairer for the City of Peterborough Electricity Department. Plumber-jointer for the Borough of Nelson Electricity Department. Consumers' engineer (£363) for the Wolverhampton Corporation Electricity Department. Financial assistant (£700) for the Municipality of Singapore Electricity Department. Assistant workshops superintendent for the Government of the Gold Coast. Assistant mains engineers, junior mains assistant, and junior assistant for mains drawing office for the Northampton Electric Light and Power Co., Ltd. Assistant mains engineer for Aden (Arabia) Electricity Department. Chief lecturer in the electrical engineering section of the engineering department of Halifax Municipal Technical College. Electrical engineer for New Mill Urban District Council. (See our advertisement pages to-day.)

A.S.E.E. Dinner and Dance.

The whist drive, dinner and dance held by the Association of Supervising Electrical Engineers at "Ye Mecca" Restaurant, Ludgate Hill, E.C., on November 16th, was an outstanding

success; over 240 members and friends participated. The chairman of the Association, Mr. B. C. Garman, presided at the dinner, and referred with regret to the absence of Mr. S. B. Donkin, the president. Mr. F. W. Smith proposed the toast of "The Ladies," and Mrs. B. C. Garman replied. The M.C. for the whist drive was Mr. E. E. Gammon, and the M.C.'s for the dance were Messrs. E. L. Eastell and F. W. Smith. The winners of the whist drive prizes were as follows:—Ladies': 1st, Mrs. N. Young; 2nd, Mrs. E. R. Carter; and "booby," Miss P. Wray. Gents': 1st, Mr. E. D. Smith; 2nd, Mr. C. Norriss; and "booby," Mr. C. H. Taylor. Music was provided by the Connaught Dance Band, and the spot-lights, which added to the general success of the function, were loaned through the good offices of Mr. L. E. Buckell.

Educational.

The annual report for the Royal Technical College, Glasgow, for the 1928-29 session, shows that the total enrolments in electrical engineering for the day and evening classes was 756. The total student-hours for the same subject was 26,446.

Mishap at Nechells.

As was briefly reported last week, about midnight on Tuesday, November 19th, an explosion, which caused some alarm, took place at the Prince's power station, Nechells, of the Birmingham Corporation. Immediately afterwards light and power failed in several parts of the city, and also in some areas outside, including Sutton Coldfield, which draws power from Birmingham; certain works at which night shifts were engaged had their power and light cut off for a time. It was officially reported that the cause of the trouble was the bursting of a 33-kV transformer; the oil burst into flame, and had the transformer house been within the station instead of being isolated, the damage might have been greater. Happily, no workers were in the vicinity, so that the trouble was practically confined to the destruction of the transformer, which cost £6,000. Owing to the danger, the station was at once closed down, but the recent inauguration of the Hams Hall station enabled the supply to be restored fairly quickly, so far as the main night users were concerned. This is the first instance in the Midlands in which full recourse had to be had to an alternative supply, and the change-over was facilitated by the fact that the load at the time of the occurrence was light. The Summer Lane station was also requisitioned, and within a few hours of the occurrence three of the turbo-alternators at Nechells had been restored to service, and shortly afterwards the whole of the seven machines were in commission again.

Battersea Power Station.

The Ministry of Transport issued, last Tuesday night, as a white paper (Stationery Office, Cmd. 3,442, price 6d.) the interim report of the committee appointed to consider the question of sulphur fumes in connection with the proposed station at Battersea.

Fatality.

An inquest was held at Swansea, on November 20th, on Hetty Gorman (16), who received a fatal electric shock on November 11th when closing the gate of her garden. It was stated that a wire fence divided the houses, and the theory was that a worn flexible cable running from a neighbour's workshop at the bottom of his garden to his house was in contact with the wire fence, the result was that the current passed up one stay and down another of an aerial pole, and then along the fence again to Gorman's garden gate, which was kept closed by a wire loop. A formal verdict was returned.

The Electrical Association for Women.

On November 14th a successful social afternoon was held by the Electrical Association for Women at 46, Kensington Court, W.8, and an interesting talk was given on the electrical appliancs in the model electric kitchen by Miss Norvick.

Within the last few weeks four new branches of the Association have been formed: East Devon—President, Mrs. Phillips; Joint Hon. Secretaries, Miss Wilson at Exeter and Miss Binney at Torquay. The Hartlepools & District—President, Lady Gray; Hon. Secretary, Mrs. J. H. Parker. Edinburgh & District—President, Viscountess Elibank; Vice-President, Miss M. G. Cowan; Hon. Secretary, Miss M. McNicoll. Plymouth—President, Viscountess Astor, M.P.; Joint Hon. Secretaries, Mrs. Goodall and Miss Hollest.

Mr. F. Forrest (Birmingham Electric Supply Department) contributed a paper (which was read by Mr. W. Lawson, in his absence) dealing with his American tour, before the Birmingham and Midland Branch of the Electrical Association for Women, on Wednesday last. Mr. Forrest attributes the great use of electricity in America—in spite of high gas consumption—to more extreme climatic conditions (compared with this country); the difference in the conditions under which the majority of the people lived; the greater use of electricity in factories; low tariffs framed to stimulate long-hour use; low cost of lamps and other apparatus; and a very strong selling organisation. In America the cost of electricity was about 1.15d. per unit, and in this country it was about the same, but salaries being higher in America the percentage of income spent on an equivalent supply of electricity was much less than here. In America, too, the "step-rate" gave a diminishing average price, according to quantity. An ordinary 40-watt lamp, which cost 2s. 4d. here, could be purchased anywhere in the States for 11d.

How to work under electric light without eye strain was the principal topic of a lecture given by Mr. T. Catten, of the Electric Lamp Manufacturers' Association, to members of the newly-formed Torquay branch of the Electrical Association for Women on November 19th. Mr. Catten explained how the diffused light shed by the opal bulb threw no shadows and imposed no strain on the eyes. Mr. J. Taylor and Miss M. M. Partridge, B.Sc., A.M.I.E., of Exeter, spoke of the excellence of the Association's aims.

I.E.E. North-Western Centre Dinner.

The annual dinner of the North-Western Centre of the Institution of Electrical Engineers was held on November 19th at the Midland Hotel, Manchester, and was attended by 270 members and guests. Mr. T. E. Herbert, chairman of the Centre, presided.

After the toast of "The King, Duke of Lancaster" had been honoured, Dr. H. Levinstein (chairman, Society of Chemical Industry) proposed "The Cities and Trade of Manchester and Salford." He said the two cities formed a very important centre of the electrical industry. In that respect they were absolutely modern and up-to-date.

Responding to the toast, Mr. Warbreck Howell (town clerk of Manchester) said the electrical industry was well organised and attracted the best types of young men. There was scope for ingenuity in improving methods of distribution. He hoped the cost to the consumer would be thereby reduced, so that it would be possible to bring into the homes of the poorer classes of the community the benefits and advantages which electricity offered in cleanliness, convenience, and the saving of labour.

The Rt. Hon. Lord Colwyn, proposing the toast of "The Institution of Electrical Engineers," said that the electrical industry, like other industries, was concerned with the great problems which the country had now to face—taxation, unemployment, and the development of bureaucracy. There were in the ranks of the electrical industry young men equipped with brain power and admirable qualities of mind, who ought to play their part in arriving at a solution of the problems. Especially he warned them not to seek to get rich by speculation. That did neither service to the country nor honour to themselves, but honest work would bring untold blessings.

Col. Sir T. F. Purves, O.B.E. (president of the Institution) said it had been his privilege to address the members of the North-Western Centre through the medium of the microphone and the loud-speaker, his presidential address having been relayed from London, but it was more satisfactory to meet them face to face. Manchester was honourably associated with the industry, art, science, and thought of England. In the same way the North-Western Centre was associated with the good work which the Institution carried on. The brains of the Institution could not be localised and concentrated in London; they were distributed throughout the whole of the organisation, whose life and usefulness depended upon the Centres. Each Centre had its individual life, and power to act independently; but all could unite and bring their collective wisdom to bear upon the problems which presented themselves. It was necessary for headquarters to know the conditions which arose in various parts of the country and how they were tackled by the Centres. The latter must not take it amiss if sometimes the attitude of London seemed to them a little paternal. A little investigation and a little comprehension would clear away all difficulties.

The chairman proposed the toast of "Our Guests," which was replied to by Mr. E. F. Stowell. The last toast, "The Chairman," was given by Mr. J. Harcourt Williams.

Midland Electrical Engineers' Ball.

The Midland Electrical Engineers' Annual Ball took place at the Grand Hotel, Birmingham, on Friday, November 15th. About 450 persons sat down to supper. During the evening a presentation was made by Mr. W. H. Heaton, chairman of the Engineers' Ball Committee, to Mr. and Mrs. R. A. Chattock, on the occasion of Mr. Chattock's retirement from the city electrical engineership, and to show appreciation of his valuable services as president of the Engineers' Ball Committee from its inception. The gift took the form of an antique silver cream jug and sugar basin, together with an old oak linen chest. The whole of the proceedings, which were most enjoyable, reflected great credit on the arrangements made by the committee.

The New Abertillery Sub-station.

The new central sub-station of the Abertillery Urban District Council was officially inaugurated at Abertillery on Thursday last week by Mr. W. Beignor, chairman of the Council. The equipment consists of a 300-kVA Hackbridge transformer, the supply being taken from the Ebbw Vale Co., Ltd., at 10,000 volts, 3-phase, 50 cycles. The high-voltage equipment was supplied by Messrs. A. Reyrolle & Co., Ltd., and consists of one of their T.D.12 oil switch-fuses with oil-immersed isolating links. The supply is duplicated from the ring main, and special interlocking features are arranged so that it is impossible to get out of synchronism. The low-voltage distribution (460 V) is supplied from a board manufactured by the Electrical Construction Co., Ltd. The substation itself was erected under the supervision of Mr. Dawson Thomas, engineer and manager of the Abertillery Council's electricity department.

The high-pressure supply was switched on by Mr. Frank

Hodges, J.P., member of the Central Electricity Board, who was presented with a specially mounted and inscribed operating rod by the manufacturers. Mr. James Hillier (chairman of the Electricity Committee) switched on the low-pressure gear, and was presented by the manufacturers with a silver inkstand.

Proposing the toast of "The Abertillery Urban District Council" at a subsequent dinner, Mr. Frank Hodges referred to the heart-breaking task which the Council and its officers had had to face during the last ten years, and he congratulated them on embarking on electrical development, when, from the point of view of local conditions, they ought to be in the candle stage. He also congratulated Mr. Dawson Thomas on his foresight in connection with the establishment of the sub-station.

The toast of the "Electricity Committee" was submitted by Mr. S. B. Haslam, chairman of the Western Centre of the Institution of Electrical Engineers, and Councillor James Hillier responded.

E.P.E.A. Annual Dinner.

The eleventh annual dinner of the South Coast Section of the Electrical Power Engineers' Association was held at the Masonic Hall, Albion Place, Southampton, on November 16th. The gathering was presided over by Mr. J. B. B. Howat, chairman of the Section for the second year in succession.

Following the loyal toast the health of the Association was proposed by Mr. P. G. Sparry (lecturer in electrotechnics, University College, Southampton), who spoke of the good work done by the Association in gaining recognition of the worth and merits of the electrical engineer. The assistance rendered to the staff engineer in making him competent to deal with any problems he might encounter also played a most important part in the work of the Association.

Mr. T. D. Martin, president of the Association, who responded to the toast, stated that the Association had been occupied during the last year in revising the schedule of salaries and conditions. On comparing the returns of the electrical undertakings in the country, it would be noticed that the undertakings which were in the soundest positions financially were those which applied the Association's salary schedule most rigorously. The fact that many undertakings were able to sell electricity at a price less than pre-war spoke well of the attention paid by the Association to the economic and scientific sides of the industry. Referring to the grid scheme, Mr. Martin said that there would be a considerable reduction in the number of power stations in operation. That would mean that many more men would be required on the distribution side and fewer and more highly-skilled men on the generating side. The Association should be prepared to meet these altered conditions.

Mr. Howat, in giving the toast of "The Visitors," said that the power station had not yet been invaded by the ladies, but much useful work was being done by them through the Electrical Association for Women in promoting the use of electricity. Replying to that toast the Mayor of Southampton paid tribute to the progress made by the Southampton Electricity Department, and added that electricity was one of the cheapest things in the town. Testimonials in the form of cheques were presented to Mr. Egan and Mr. Denne for their services to the section in their capacities of hon. secretary and hon. treasurer, respectively.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

The Hewittic Electric Co., Ltd., informs us that Mr. E. A. H. BAGNALL is leaving on December 13th for an extensive tour of India on behalf of the company. Before he sails Mr. Bagnall will be pleased to meet any engineers who may be interested in the company's products for India, if they will communicate with the head office, Walton-on-Thames, Surrey.

The marriage took place on November 21st, of Mr. CHARLES FURNESS, borough electrical engineer and tramway manager, Blackpool, and Mrs. M. V. McCandlish. Mr. J. H. Farthing, of Bowden, Cheshire, was the best man. Later in the day Mr. and Mrs. Furness motored to London; they are to visit the Continent.

The marriage took place at Leamington Spa, on November 12th, of Mr. ERIC R. KNIGHT, of the Leicestershire & Warwickshire Electric Power Co.'s staff, and Miss Dorothy E. Stouthorn.

The marriage took place on November 9th, at Lymm, of Mr. RICHARD MACUE, of the Warrington Corporation Electricity Department, and Miss Winifred Hewitt. The bridegroom received from his colleagues an inscribed chiming walnut clock.

The Barnes Urban Council on November 12th received the resignation of Mr. G. C. LAW, assistant electrical engineer, who has been appointed deputy electrical engineer and manager by the Hammersmith Borough Council. The Council decided that its thanks for Mr. Law's services should be recorded on vellum and sealed.

Shoreditch Borough Council Establishment and Staff Committee recommends that Mr. A. F. COX, outside engineer of the Hewittic Electric Co., Ltd., be appointed electrical maintenance engineer at a salary of £423 per annum.

Mr. R. A. CHATTOCK, city electrical engineer of Birmingham, is to retire from the Corporation's service under the age limit in January next, after occupying the position since 1903. Mr. Chattock is a native of Solihull. He was educated at University College, London, and after serving his apprenticeship as a mechanical engineer at the Blackwall Ironworks, London, he became assistant engineer to the Metropolitan Electric Supply Co. In this position he obtained a very varied experience, being for the greater part of the time superintendent engineer at one of the company's stations. Later he became superintendent engineer of the Bankside generating station of the City of London Electric Lighting Co. He held this post for five years, and in 1900 he was appointed city electrical engineer of Bradford. Important extensions were carried out under his direction, and it was claimed for Mr. Chattock that he produced power at a cost lower than that at any similar station in the country. He was three years at Bradford, and on the acquisition by the Birmingham Corporation of the electricity supply undertaking, then under company management, Mr. Chattock was appointed to the chief executive office.

The growth of the Birmingham Electric Supply Department has been phenomenal. From time to time important extensions have been made under the direction of Mr. Chattock, who has long been regarded as one of the national leaders in his profession. He was responsible for the designing, erection, and equipping of the generating stations at Summer Lane and Nechells, for the enlargement of the latter station (one of the largest in the country), and more recently for the creation of the large "super" station at Hams Hall, Birmingham. During the war period Mr. Chattock devoted the whole of

Lafayette [*Manchester.*

Mr. R. A. Chattock,

Who is retiring from the position of City Electrical Engineer, Birmingham.

his energies to increasing the output of electric power in Birmingham to meet the demands of the munition factories. He was conspicuously successful, and to meet the enormous demand additional generating stations of a temporary character had to be established. Mr. Chattock is highly esteemed by the electrical profession of this country. For many years he has been closely identified with various professional

organisations, and in 1925 he was elected President of the Institution of Electrical Engineers. He had previously filled the offices of President of the Incorporated Municipal Electrical Association, and of the Birmingham Association of Mechanical Engineers.

Mr. J. G. OGG, who has been radio engineer at the Metro-Vick Newcastle office, is leaving to take up an appointment under the Air Ministry (Technical Development Department).

It was announced last week that Mr. BERNARD D. F. DOCKER and Sir E. WYLDBORE-SMITH had retired from the board of Associated Electrical Industries, Ltd.

Mr. W R. CURTIS has relinquished his position in the Wiring Supplies Department of the British Thomson-Houston Co., Ltd., to take up an appointment as sales director to Messrs. Chas. Preston & Co., Ltd., of Berners Street, W.

A Bury paper states that Mr. H. B. DORRELL, who for many years has been mains superintendent to the Bury Corporation Electricity Department, has resigned in order to assist his brother in the management of a large building concern in London. He was recently presented with a barometer and lunch basket by his fellow employés.

Mr. EDWIN SEDDON, M.I.E.E., M.I.Mech.E., City Electrical Engineer, Edinburgh, has been elected president of the Royal Scottish Society of Arts.

Messrs. Richard Garrett & Sons, Ltd., of Leiston, have appointed Mr. CYRIL M. PLANE as sales engineer in connection with their electric trolley-'bus business. Mr. Plane has had a very close and lengthy experience of the design, manufacture, and installation of trolley-'bus vehicles.

Mr. E. MORGAN has now taken up his position as general manager of the City of Sheffield Electric Supply Department. His new permanent address is "Glensone," 23, Thornsett Road, Sharrow, Sheffield (telephone No. 50575.)

The Louth Town Council has appointed Mr. EDGAR MARSDEN, of New Mill, near Huddersfield, as electrical engineer at a salary of £300 per annum. The appointment is in connection with a new scheme by which the Town Council will be supplied with electricity in bulk by the Grimsby Corporation.

Mr. T. R. MARTIN having resigned his position as joint managing director of Messrs. J. H. Tucker & Co., asks that correspondence of a personal nature shall be addressed to him at his private address, "Highland Lodge," Wellington Road, Edgbaston, Birmingham.

The Bedford Electricity Committee has appointed Mr. H. W. MILLATT, showroom manager at Chester, as sales manager, at £400 per annum.

Sergt. J. B. HAMILTON, V.C., has been appointed a traveller on the staff of Messrs. J. J. Inglis & Co., Glasgow, in connection with the sale of "Tungsram" valves for which the firm is sole Scottish representative.

The Leeds Electricity Committee recommends the appointment of Mr. J. F. SARVENT as resident engineer at the Kirkstall power station. Mr. Sarvent is at present power station superintendent to the Hammersmith Borough Council.

In the note upon the registration of Armaflex (Parent), Ltd., in our last issue (p.915), Sir WILLIAM HORWOOD was described as a director of Philips Lamps (England), Ltd. The correct style of the company is, of course, Philips Lamps, Ltd.

Obituary.—MR. R. W. POPE.—We regret to learn from the *Electrical World* of the death, on November 1st, of Mr. Ralph Wainwright Pope, honorary secretary of the American Institute of Electrical Engineers. Mr. Pope, who commenced his career in the railway and telegraph services of the United States, became a journalist, and in 1885, the year following its organisation, he was appointed secretary of the Institute. In 1911 he resigned that position, and was thereupon elected honorary secretary for life.

MR. T. WILSON.—The death took place suddenly on November 19th of Mr. Thomas Wilson, Southwood, Stirling. Mr. Wilson, who was in his 60th year, had been in India for 30 years, being a director of the firm of Jessop & Co., civil, mechanical, and electrical engineers. He returned to this country in 1918.

Dr. W. C. ESCHER.—*The Financial Times* records the death of Dr. W. C. Escher, chairman of the Crédit Suisse in Zurich, and a distinguished figure in banking and industrial circles in Switzerland. "Besides acting as chairman of the Board of the Banque pour Enterprises Electriques, a powerful holding company for the shares of international electrical undertakings, which is closely allied to the Crédit Suisse, he was a director of the Cia. Hispano-America de Electricidad (better known as 'Chade'). Among Swiss industrial companies he was a director of . . . Entreprises Sulzer, the engineering concern."

Mr. W. B. SAYERS.—We regret to learn that Mr. William Brooks Sayers died on Sunday, November 17th, after a few days' illness, at the age of 68 years. He was born at Isleworth, Middlesex. Mr. Sayers was the inventor of the "Sayers" system, which utilised the armature winding for the compounding of dynamos and the suppression of sparking; it was extensively adopted in machines for some heavy duties. Other inventions relating to dynamos stand to his credit; lately he had been occupied with designs for some new uses of dynamos. He joined Colonel Crompton's staff at Chelmsford in 1882, where he had for colleagues the late Dr. Gisbert Kapp and Mr. James Swinburne. He assisted in the Birmingham Town Hall installation, carried out jointly by Messrs. Crompton and Winfield; this was then the largest incandescent lighting installation in the Midlands. Messrs. Chamberlain and Hookham were just at that time launching an electrical department, and they engaged Mr. Sayers's services for dynamo design. Some years later he became electrical designer to Messrs. Mavor & Coulson, who made the first dynamo with "Sayers" windings. About 1896 he set up as consulting engineer in Glasgow, where he was joined by his brother James, who continued the business after the late Mr. Sayers had retired from it. Mr. Sayers was twice married.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Podmore's, Ltd.—Private company. Registered November 16th. Capital, £5,000 in 4,000 7½ per cent. participating preference shares of £1 each and 2,000 ordinary shares of 10s. each. Objects: To acquire the business of manufacturers of gas and electric heating and lighting and cooking apparatus, metal spinners, sheet metal workers and general merchants and dealers now carried on at 34, Charles Street, Hatton Garden, E.C.1, as "A. E. Podmore & Co." The subscribers (each with one ordinary share) are: Mrs. C. Olivier; S. T. Balls, electrical engineer; G. P. Olivier, engineer, all of 34, Cowcross Street; H. W. Hensman, 4, Brick Court, Temple, E.C.4, barrister; H. A. Chapman, 26, Vineyard Hill Road, Wimbledon Park, S.W.19, export merchant. Solicitors: M. L. Moss & Son, Savoy House, 115-116, Strand, W.C.2.

Hunter & Piquart, Ltd.—Private company. Registered November 16th. Capital, £300 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in apparatus and accessories for use in connection with radio, in particular cables, wires, batteries, detectors, switches, condensers, head telephones, valves, receivers, amplifiers, and aerial and other insulators; manufacturers of and dealers in optical, photographic, musical, scientific, and other instruments, &c. The directors are: B. J. Hunter, 407, Edgware Road, W.; J. Piquart, 116, St. Paul's Road, Highbury, N. Qualification: £50 shares. Registered office: 21, Glasshouse Yard, Aldersgate Street, E.C.1.

Sam Sharples, Ltd.—Private company. Registered November 19th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of electrical and mechanical engineers and contractors for the carrying out of electrical and mechanical work, including electric lighting and power, &c. The subscribers (each with one share) are:—S. Sharples, 3, Hanging Ditch, Manchester, electrical engineer; S. Hindle, 78, King Street, Manchester, accountant. S. Sharples is permanent governing director. Solicitor: M. Rigby, 15, Cooper Street, Manchester.

Elite Iron and Wire Works Co., Ltd.—Private company. Registered November 19th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of manufacturers and workers of, and dealers in wire, cable, and ropes of all descriptions, mechanical, electrical, telegraph, telephone and wireless engineers, manufacturers of, and agents for lead pipes, agricultural and horticultural implements, &c. The first directors are:—Mrs. Ethel McElhatton, 1, Hilltop Avenue, Hill Lane, Blackley, Manchester (chairman); H. Bradshaw, 25, Mansfield Road, Blackley; H. C. Simpson, "Symbroc," Park Road, Gatley (assistant managing director of James Simpson & Co., Ltd.). The above directors are permanent. Secretary: H. C. Simpson. Registered office: 34, Upper Cyprus Street, Holt Town, Manchester.

Official Returns of Electrical Companies.

Electrodrives, Ltd.—D. E. Evans, 29-30, King Street, Cheapside, E.C.2, was appointed receiver and manager on November 11th, under powers contained in debenture dated October 5th, 1929.

British Automatic Refrigerators, Ltd.—Debenture dated November 11th, 1929, to secure £20,000, charged on land at Rotherham, and the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd.

Wolf & Morgan, Ltd. (formerly Wagner Electric Supplies, Ltd.).—Issue on November 6th, 1929, of £1,000 debentures, part of a series already registered.

Craven Hydro-Electric Supply Co., Ltd.—Debenture dated October 24th, 1929, to secure £5,000, charged on the company's property, present and future, including uncalled capital. Holders: Linton Mills Estates Co., Ltd.

Kalgoorlie Electric Tramways, Ltd.—Capital, £250,000 in £1 shares. Return dated July 29th, 1929. All shares taken up. £250,000 paid. Mortgages and charges, £119,800, and interest accrued on 6 per cent. "B" stock from April 1st, 1912.

Indo-European Telegraph Co., Ltd.—Capital, £450,000 in £25 shares. Return dated May 9th, 1929. 17,000 shares taken up. £425,000 paid. Mortgages and charges, nil.

W. T. Henley's Telegraph Works Co., Ltd.—Capital, £1,000,000 in 800,000 ordinary shares of £1 each and 40,000 preference shares of £5 each. Return dated July 26th, 1929. 650,000 ordinary and 40,000 preference shares taken up. £612,480 paid on 413,080 ordinary and 39,880 preference shares. £237,520 considered as paid on 236,920 ordinary and 120 preference shares. Mortgages and charges, £150,000.

Concordia Electric Wire Co., Ltd.—Capital, £100,000 in £1 shares. Return dated July 12th, 1929. 57,319 shares taken up. £57,319 paid. Mortgages and charges, £33,600.

Newquay Electric Light and Power Co., Ltd.—Capital, £50,000 in £1 shares. Return dated May 9th, 1929. 45,000 shares taken up. £34,820 paid. £10,180 considered as paid. Mortgages and charges, nil.

A. W. Penrose & Co., Ltd.—Capital, £45,000 in 10,000 first preference, 5,000 second preference, and 30,000 ordinary shares of £1 each. Return dated June 5th, 1929. 10,000 first preference, 500 second preference, and 30,000 ordinary shares taken up. £10,507 paid. £29,993 considered as paid. Mortgages and charges, £1,100.

Rhondda Tramways & Electric Supply Co., Ltd.—Capital, £100 in £1 shares. Return dated May 30th, 1929. Seven shares taken up. £7 paid. Mortgages and charges, £54,000.

Ellis & Ward, Ltd.—Capital, £10,000 in 2,000 preference and 8,000 ordinary shares of £1 each. Return dated August 5th, 1929. 1,000 preference and 6,003 ordinary shares taken up. £1,003 paid on 1,000 preference and 3 ordinary shares. £6,000 considered as paid on 6,000 ordinary shares. Mortgages and charges, nil.

Electricity Distribution of North Wales and District, Ltd.—Capital, £205,500 in 200,000 preference shares of £1 each and 110,000 ordinary shares of 1s. each. Return dated May 27th, 1929. All shares taken up. £164,500 paid (being £1 per share on 150,000 preference, 5s. per share on 50,000 preference, and 1s. per share on 40,000 ordinary shares). £3,500 considered as paid on 70,000 ordinary shares. Mortgages and charges, £150,000.

Shoreham and District Electric Lighting and Power Co., Ltd.—Capital, £27,500 in £1 shares. Return dated April 25th, 1929. 17,329 shares taken up. £10,829 paid. £6,500 considered as paid. Mortgages and charges at date of return: £16,200. Issued October 1st, 1929: £1,300 6 per cent. ten-year notes.

Rheostatic Co., Ltd.—Capital, £25,000 in £1 shares. Return dated July 5th, 1929. 12,000 shares taken up. £9,721 paid. £2,279 considered as paid. Mortgages and charges, £2,618 6s. 10d. A return of allotments, made up to July 26th, 1929, shows a further 3,501 shares allotted, payable in cash and fully called up.

Yorkshire Electric Transformer Co., Ltd.—Capital, £5,000 in £1 shares. Return dated May 11th (filed July 24th), 1929. 4,430 shares taken up. £4,430 paid. Mortgages and charges, nil.

Luth & Rosen Electric Co., Ltd.—Capital, £1,000 in £10 shares. Return dated April 27th, 1929. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Mansbridge Condenser Co., Ltd.—Capital, £25,000 in £1 shares. Return dated September 10th, 1929. All shares taken up. £10,000 paid. £15,000 considered as paid. Mortgages and charges, nil.

T. W. Broadbent, Ltd.—Capital, £5,000 in 440 5 per cent. preference and 560 ordinary shares of £5 each. Return dated August 6th, 1929. All shares taken up. £35 paid on 7 ordinary shares. £4,965 considered as paid on the remainder. Mortgages and charges, nil.

Hydro-Electric Power & Public Services Trust, Ltd.—Capital, £500,000. Return dated June 18th, 1929. £100,000 6 per cent. cumulative preference stock and £287,705 ordinary stock taken up. £387,705 paid. Mortgages and charges, nil.

Clowne Electric Supply Co., Ltd.—Capital, £3,000 in £1 shares. Return dated May 30th, 1929. All shares taken up. £3,000 paid. Mortgages and charges, nil.

Kalgoorlie Electric Power & Lighting Corporation, Ltd. Capital, £50,005 in 5 preference shares of £1 each and 100,000 ordinary shares of 10s. each. Return dated June 6th, 1929. All shares issued and fully paid up. Mortgages and charges, £102,880.

Belshaw & Co., Ltd.—Capital, £3,000 in 2,500 preference and 500 ordinary shares of £1 each. Return dated October 9th, 1929. 2,000 preference and 500 ordinary shares taken up. £2,500 considered as paid. Mortgages and charges, nil.

Adamant Supplies Co., Ltd.—Capital, £5,000 in £1 shares. Return dated July 12th, 1929. 2,603 shares taken up. £502 paid. £2,101 considered as paid. Mortgages and charges, nil.

Wood & Co. (Ipswich), Ltd.—Capital, £3,500 in 1,000 preference and 2,350 ordinary shares of £1 each and 3,000 founders' shares of 1s. each. Return dated August 31st, 1929. All shares taken up. £3,350 paid on 1,000 preference and 2,350 ordinary shares. £150 considered as paid on 3,000 founders' shares. Mortgages and charges, nil.

Cuba Submarine Telegraph Co., Ltd.—Capital, £220,000 in 6,000 preference and 16,000 ordinary shares of £10 each. Return dated August 30th, 1929. All shares taken up. £220,000 paid. Mortgages and charges, nil.

Gorseinon Electric Light Co., Ltd.—Capital, £60,000 in £1 shares. Return dated March 29th, 1929. 57,000 shares issued and fully paid up. Mortgages and charges, nil.

Royce, Ltd.—Capital, £170,000 in 70,000 preference and 100,000 ordinary shares of £1 each. Return dated September 4th, 1929. 34,955 preference and 72,487 ordinary shares taken up. £27,461 paid (being £1 per share on 4,955 preference and six ordinary and 15s. per share on 30,000 preference shares). £79,981 considered as paid (being £1 per share on 72,481 ordinary and 5s. per share on 30,000 preference). Mortgages and charges: £24,871 17s.

Coatbridge & Airdrie Electric Supply Co., Ltd.—Capital, £200,000 in £1 shares. Return dated May 17th, 1929. 158,200 shares taken up. £157,200 paid. £1,000 considered as paid. Mortgages and charges, nil.

Electro Dynamic Construction Co., Ltd.—Debenture charged on deeds and documents relating to Dynamo Works, Devonshire Grove, S.E., and the company's undertaking and property, present and future, including uncalled capital, dated November 8th, 1929, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Peter Raven & Co., Ltd.—Particulars filed of £1,000 debentures, authorised October 10th, 1929, charged on the company's undertaking and property, including uncalled capital, the amount of the present issue being £400.

City Notes.

Indo-European Telegraph Co., Ltd.

The directors have notified the shareholders of an offer to purchase their holdings by Imperial & International Communications, Ltd. The basis of the offer, which has been provisionally accepted, is £55 cash for each £25 share, and it is stipulated that the offer is conditional upon acceptance by holders of 90 per cent. of the issued capital. The directors consider the offer a satisfactory one, and advise its acceptance. Upon the completion of the purchase, Mr. H. L. M. Tritton, Sir Rayner C. Barker, Mr. F. J. Brown, and Mr. C. H. Tritton will retire from the board, and will receive as compensation £27,000 to be divided between them. In the case of the managing director (Mr. Axel W. Berg), £30,000 is to be put on trust for payment to him upon loss of office, unless he is offered and accepts other employment with the company or the Communications Company. Compensation will also be awarded to any members of the British and foreign staffs who are displaced as a result of the purchase.

Ferranti, Ltd.

The annual meeting was held on November 21st, Dr. S. Z. de Ferranti (chairman) presiding. In presenting the report and accounts, the chairman said that the balance-sheet showed that £44,867 had been spent on additional buildings, plant, machinery, &c. The bank overdraft was £96,805, and this position arose partly from the fact that the balance of the first mortgage debenture stock was paid off in 1928 (approximately £48,000), and in other part to the expansion of trading which had taken place. It was anticipated that this expansion would continue, and this would necessitate raising further capital. The board was considering the method by which this further capital should be raised, and it might be that their suggestions would have to be submitted to the shareholders for approval. The report and accounts were adopted.

Cape Electric Tramways, Ltd.

The report for the year ended June 30th last records a profit of £32,755 (against £38,348 for 1927-28). After providing for debenture interest, &c., there remains a balance of £13,314, to which is added £28,626 brought forward, making £41,940. It is proposed to transfer £5,000 of this to reserve, and carry forward the balance (£36,940). The directors regret that they are again unable to recommend a dividend, and refer to the continuance of severe motor-omnibus competition. The wages paid by competitors are far below those which the company is forced to pay. Steps are being taken by the Government and municipalities to deal with the present uncontrolled competition, and there is some hope of improvement in the near future. In order to reduce expenses it is proposed to transfer the entire control and management of the company to South Africa. At the annual meeting on December 18th a resolution to effect this and altering the articles of Association, will be put forward.

Telephone Manufacturing Co., Ltd.

At an extraordinary meeting on Monday last the proposals for separating the two parts of the company's business—installation and manufacturing—(outlined in our issue of November 8th, p. 824) were approved. Mr. F. T. Jackson, chairman and managing director, said that the adoption of the scheme would enable the shareholders to participate in the progressive prosperity of the subsidiary companies engaged in installing private telephone systems on a rental basis. It was hoped that the installation company's business would so develop that in a short space of time it would occupy a large proportion of the manufacturing company's factory accommodation. In conclusion, Mr. Jackson said that immediately the necessary formalities had been completed, the installation company—Telephone Rentals, Ltd.—would declare an interim dividend of 2½ per cent., and a final dividend in the early part of next year.

Electro Dynamic Construction Co., Ltd.

The annual meeting was held on November 14th. The chairman (Mr. N. Pensabene-Perez), in presenting the accounts for the year 1928-29, stated that the balance sheet showed a very satisfactory and progressive state of affairs, and proposed the following dividends:—10 per cent. on the first preference shares; 7½ per cent. on the second preference shares; and 10 per cent. on the ordinary shares. The chairman said that the development that had taken place in connection with the firm's polyphase variable-speed motor had resulted in a very successful and commercially sound machine, for which there was a rapidly-increasing demand. The volume of business received from the Admiralty and other Government Departments had materially increased; the prospects for the future were good.

Stock Exchange Notices.

Application has been made to the Committee to allow the following to be officially quoted:—

Atlas Light and Power Company.—250,000 ordinary shares of £1 each, fully paid, Nos. 2,750,001 to 3,000,000.

Shropshire, Worcestershire and Staffordshire Electric Power Co.—200,000 six per cent. cumulative preference shares of £1 each, fully paid, Nos. 1,950,001 to 2,150,000.

East India Tramways Co., Ltd.

The gross receipts for the year ended July 31st, 1929, were £50,330, and the balance on working amounted to £14,177. To this is added £491 brought forward, making £14,668. The reserve for renewals receives £500, £1,500 is set aside for income tax, the dividend on the preference and ordinary shares is 5 per cent. (half already paid), and the deferred shares are to receive 10 per cent., leaving £622 to be carried forward.

Lighting Trades, Ltd.

The accounts for the year ended March 31st, 1929, show a credit balance of £1,311, this is added to the sum of £3,125 brought in, and the whole amount (£4,436) is carried forward. The volume of sales is said to have been satisfactory, although prices have been depressed by competition. During the year £16,500 of first-charge debenture stock was redeemed.

American Gas and Electric Co.

The stockholders have received a circular assuring them that the recent events on Wall Street have had no adverse effect upon the real value of the company's holdings. Earnings are said to be increasing, and contracts for large amounts of new business are being received. The company's assets are valued at over $400,000,000.

Ebonite Container Co., Ltd.

The directors propose to increase the capital to £400,000 by the creation and issue of 200,000 4s. shares. The proceeds will be utilised to acquire a controlling interest in an old-established business which is not named. The new shares will be offered at par to existing shareholders.

Buenos Ayres Town and Docks Tramways, Ltd.

The accounts for the year ended June 30th last show gross receipts of £179,891, against £169,219 in 1927-28, and net receipts amounting to £36,029 (£36,848), working expenses having been higher. Adding £4,719 brought forward and interest, and deducting debenture interest, &c., the balance available is £42,209. Of this £20,000 is put to renewals reserve, £1,000 is written off the cost of works, and a dividend of 3½ per cent. is being paid, leaving £3,881 to go forward.

Dutch Company.

At the resumed extraordinary general meeting of shareholders of Philips Glow Lamp Works, on November 21st, the increase of capital by £1,250,000 to £2,100,000 was agreed to. Asked whether it was true that a fusion between Philips Glow Lamps and the Splendor Factory had been arranged, the chairman replied that in the interests of the company no exact information could be given. All he could say was that, though a fusion had not yet been concluded, negotiations between the two companies were proceeding.—*Financial Times.*

Stocks and Shares.

TUESDAY EVENING.

THE severe shake-out in most Stock Market securities during the current month, has served to leave the markets in a sensitive condition, and one in which the effects of a number of cross-currents are abruptly marked from time to time. There is, for example, the hope that the Bank of England will further reduce its rate to 5 per cent., and in the near future. This acts as an encouragement to markets for investment stocks and shares, and removes altogether the apprehension entertained not so very long ago, that the money market would become more stringent instead of easier. The City was talking of a 7, or even a 7½ per cent., Bank Rate, so that the present 5½ per cent. to which the minimum was reduced last Thursday, is a pleasant surprise to those who looked for money to be tight up to the end of the year. The reason is, of course, that the American débâcle released enormous sums of money through the curtailment of New York brokers' loans. British capital that was being employed in America is now flowing back to this country, the result being that investment stocks and shares, as a whole, stand to benefit by the ill wind which blows good to the investor at the expense of the speculator.

The American Buyers.

Most of the British stocks and shares in which New York took a substantial interest a little while ago, and which came down heavily in price at the time of the various American panics, are now on the upgrade. For instance, Underground Electric income bonds slumped, at one time, to 101, but are now 107. Northampton Electrics, which fell to 38s., have rallied to 44s. 6d. Associated Electrics touched 27s. 6d., and G.E.C. ordinary 42s. 6d. before recovering to their present prices of 30s. and 46s. 3d., respectively. Cables & Wireless ordinary stock dropped to 35; the present price is 10 points higher. The effect of the New York panic may be said, therefore, to to have exhausted itself, so far, at all events, as the purely British companies' stocks and shares are concerned. Some people are saying, now, that it is a pity the American appetite for shares in British companies, *e.g.*, the General Electric Co., Ltd., was checked by the action of the companies in refusing to allow control to pass out of British hands. The prices offered, and paid, by American interests, were mostly a great deal higher than those now current, and America has been willing enough to sell back again a good deal of stocks and shares that she bought previously at the high prices.

Dollar Stocks.

American Telephone and Telegraph stock, which is one of those which has been moving most mercurially, at 230 shows a gain of 3 points on the week, while International Telephone and Telegraph at 75 is 5 points up. Brazilian Tractions further advanced to 43½, and the preference at 150 show a recovery of 20. Hydro-Electrics have risen from 34½ to 38½, after touching 40. Of the utility shares, Montreal Light, Heat & Power at 120 have recovered the 4½ points that they shed last week, and Pennsylvania Water & Power shares, at 82½, are 2 points up. Power Corporation of Canada at 82½ being 5 to the good. Mexican Light & Power are unchanged at 75. Shawinigan Water common shares at 81 are 5½ up. The general tendency, it will be seen, has been in an upward direction. Some of the movements are almost entirely due to New York dictation, business in the shares on this side being confined to a mere trickle excepting in Brazil Tractions, Nickels and one or two others.

Fortunes Refused.

Looking at the prices which obtained only a month ago, it is difficult—if jobbing backwards may be permitted—to see any justification for the levels that were reached by shares in a number of the popular American utility companies. The public's memory for financial operations is notoriously short, otherwise no sane person would have dreamed of paying the prices that prevailed for shares which had been, but a few years before, split from their original constituents into four, six, eight and sometimes, ten times the value of the shares when first issued. The odd part of it is that a good many people refused, sometimes brusquely, to accept even part of the really big fortunes that they could have secured by selling at the prices of some few weeks ago, which showed enormous appreciation over the original amount of money that

they put into the shares. In spite of the slump, there are handsome profits to be secured to-day by those who bought certain of the American utility issues at the time when the shares were introduced to this side, though the money realisable by the sale of such shares is now very much less than that which could have been obtained when the recent boom was at its height.

Shares on Offer.

Charing Cross Electric 4½ per cent. preference can be bought at 17s. 6d., to pay £5 2s. 9d. per cent., and the company's 4½ per cent. City Undertaking preference at the same price. Dividends in the first case are due in the middle of February and August; in the latter at the end of January and July. The City of London Electric 6 per cent. first preference are on offer at 22s. 6d., March and September dividends, to pay £5 6s. 6d. per cent., the dividends on these shares being covered many times over by earnings as shown by the last report. Edison Swan 7½ per cent., first preference are obtainable at 25s., at which the return is 6 per cent. on the money, with dividends in February and August, and Edmundson's 7 per cent. preference cost 24s. 6d., yielding £5 14s. 3d., with dividends due in the middle of January and July. The same price is asked for G.E.C. 5½ per cent. "A" preference, the return in this case being £5 6s. per cent. on the money, and the next half-yearly dividend falling due at the end of January. Newcastle-on-Tyne Electric 7 per cent. first preference, of which there are 1,000 on offer at 25s. 6d., yield 5½ per cent., with dividends in March and September; and 5,000 of the same company's 5 per cent. non-cumulative preference shares can be obtained at 19s. 9d., to pay £5 1s. 3d. per cent. These last shares carry participating rights, ranking for a further 3 per cent. after the ordinary shares get 8 per cent dividend. In the last two years the ordinary dividend has been 6 per cent. per annum. A share whose dividend is well covered by earnings is the South Metropolitan Electric Light & Power 7 per cent. preference, of which about 1,500 can be obtained at 25s. 6d., showing a yield of 5½ per cent., and with dividends payable on February 28th and August 31st.

Electricity Supply.

After the falls which overtook a good many of the shares in the electricity supply section, a mild recovery has ensued in the case of a few, Bournemouth & Poole, for instance, being ½ up to 58s. 9d., Midland Counties to 27s. 6d., Scottish Power to 29s., and Yorkshire Electrics to 32s. 6d. Clyde Valley rose 1/16 to 36s. 3d. Midland Counties new shares have improved to 6d. premium; Scottish Power new shares at 28s. 6d. are 9d. better. The new Metropolitans are unchanged at 4s. 9d. premium. Isle of Thanet at 31s. 6d., and Northamptons at 44s. 6d., are up 6d. and 2s. 6d., respectively. Egham & Staines at 35s. show a better front. British Power & Light at 14s. 9d. are 9d. harder, there being a little appreciation of our observation last week that the shares looked, at 14s., reasonably cheap as a speculative investment. Atlas strengthened to 28s., but the preference at 23s. 6d. are inclined to be easier.

Telegraphs and Telephones.

The two Cables & Wireless ordinary stocks are better, the "B" gaining 3 points at 45½. When dealings started early last July in Cables & Wireless, some of the stockholders sold their "B" at prices ranging from 90 to 100, and put the money into the 5½ per cent. preference at about the same level. The slump in the former has offered, therefore, exceptional temptation to those who like to see two blades of grass where only one blade grew before, and re-purchases stayed the headlong fall which lowered the stock, at one time, to 35. The offer of £55 per share for Indo-European Telegraphs is likely to be accepted, but the price has gone back to 52½. There are always people willing to get out, in a case like this, in advance of the final payment, and at a lower price than that offered. Marconi Marines are ¼ better at 2 3/16. A rise of 3d. in Telephone Manufacturing to 4s. 3d. middle, followed upon the shareholders' acceptance of the proposals for reorganisation of the company.

Manufacturing Companies.

Henley's are the outstanding feature of strength in the group of manufacturing companies' shares. The price fell 5s. last week, but this week, at 57s. 8d. xd, it shows a gain of 6s. 3d., allowing for deduction of the dividend last Thursday. Johnson & Phillips are also ex dividend, and at 36s. 3d. they are practically a florin better. Enfield Cable ordinary, at 4¼, have recovered the 2s. 6d. from which they parted last week. Callender's, curiously enough, which were amongst the few strong spots in our last report, have dropped the half-a-crown which they gained at that time. British Aluminium rose 1s. 6d. to 46s. Various rumours are current as to probable amalgamations amongst a number of electrical manufacturing companies, and this serves to keep alive speculative interest. English Electrics have fallen to 6s. 3d. British Electric Transformer preference have been changing hands at 10s. 6d. Babcock & Wilcox, with a rise of 3s. 9d., recovered to 3¼. Iron and steel shares are rather better as a whole, there being some tendency, according to jobbers in the market, for investment to seek the shares in this group for speculative purchase. The rubber share market is unconcerned at present, from the point of view of prices, with the various schemes which are being put forward with the intention of restricting output.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom.	Approx. Dividend. 1927.	1928.	Price Nov. 26 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	58/9	+¼	5 2 0
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary ...	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/-	—	5 6 0
Chelsea	1	8¾	8¾	25/-	—	5 12 0
City of London	1	10	10	32/-	—	4 7 6
do. do. 6% Pref....	1	6	6	22/6	—	5 6 8
Clyde Valley	1	8	8	1¼	+1/16	... ...
County of London	1	7	10	48/9	+6d.	4 2 0
do. do. 6% Pref....	1	6	6	22/6	—	5 6 8
Edmundson's 7% Pref. ...	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation ...	1	11	11	48/3	—	4 11 3
Kensington Ordinary ...	1	8	8	26/-	—	5 7 8
Lancs. Light and Power ...	1	7½	7½	27/-	—1/-	5 11 2
London Electric	1	8½	9	27/-	—	5 1 10
Metropolitan	1	9	9	36/3	—	4 19 4
do. 4½% Pref. ...	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	6½	27/6	+6d.	4 14 6
Mid. Elec. Power	1	15	8	33/9	—	4 14 10
Newcastle-on-Tyne Ordinary ...	1	6	6	23/9	—	5 1 1
do. 7% Pref.	1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref. ...	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref. ...	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall ...	1	8	8	26/-	—	5 7 8
Scottish Power	1	8	8	29/-	+6d.	5 12 3
South London	1	8½	8½	25/6	—1/-	5 9 10
Urban Ordinary	1	7	7	35/-	—2/-	4 0 0
Westminster Ordinary ...	1	8½	8½	25/-	—6d.	5 12 0
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	23/6	—	6 7 8
Yorkshire Elec.	1	8	8	32/6	+6d.	4 18 6

Home Rails.

Central London Ord. Assented ...	Stock	4	4	71	—	5 12 8
Metropolitan	"	8	8½	61½	+1	5 13 10
do. District	"	4	5	72½	+½	6 18 0
Underground Electric	£1	5	7	32/6	+6d.	6 4 5
do. do. Income ...	Bonds	6	6	107	+2	5 12 2

Telegraphs and Telephones.

Anglo-Am. Tel. Pref.	Stock	6	6	99½	—	6 0 7
do. Def.	"	1½	1½	24¾	—	6 4 5
Automatic Telephone	1	10	12½	37/6	—	6 13 4
Cables & Wireless 5½ Pref.	Stock	—	—	96½	—	5 14 0
do. A 7½ Ord.	"	—	—	81½	+2	... ...
do. B Ord.	"	—	—	45½	+3	... ...
Globe Tel. and T. Ord.	10	10	10	23	—	*4 7 0
do. do. Pref.	10	6	6	10⅞	—	5 9 1
Great Northern Tel.	10	20	17½	29	—	6 0 9
Indo-European	25	10	10	52½	−2½	*3 16 2
Marconi-Marine	1	12½	15	2 3/16	+⅛	... ...
Oriental Telephone Ord	1	12	12	21/6	—	... ...

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	8 1/16	—	8 19 6
do. do. 2nd Pref. ...	5	6	6	8 1/16	—	9 16 0
do. do. 5% Deb. ...	Stock	5	5	72½	—	6 18 0
British Electric Traction Def. Ord.	"	5	5	1400	+150	... ...
do. do. Pref. Ord.	"	8	8	120xd	—	6 13 4
Brazil Traction	100	7	8	43½	+1½	4 11 6
Brit. Columbia Elec. Rly. Pos. ...	Stock	5	5	87½	+1	5 14 3
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/-	—	... ...
London United Tram Deb. ...	Stock	4	4	51½	—	7 15 4
Mexico Trams, 5% Bonds ...	—	5	5	65	—	7 12
Mexican Light Common	100	Nil	Nil	75	—	... ...
do. 7% Pref.	100	7	7	77½	—	9 0 8
do. 1st Bonds	—	5	5	77½	—	6 9 0
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	—	1½	+6d.	4 0 0
Babcock & Wilcox	1	18	15	62/6	+3/9	*4 16 2
British Aluminium Ord.	1	10	10	46/-	+1/6	*4 7 0
British Elec. Transformer Pref. ...	1	7	7	12/-	—	... ...
British Insulated Ord.	1	15	15	8½	—⅛	4 0 0
Brush Ord.	Stock	10	10	126½	—	7 18 1
Callenders	1	15	15	8½	—	4 2 9
do. 6½% Pref.	1	6½	6½	1½	—	5 4 0
Crompton Parkinson Ord.	5/-	—	30	30/-	—6d.	7 10 0
do. 8% Pref.	1	8	8	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	7 1 3
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	7½	6½	15/-	—	7 6 8
Enfield Cable Ord.	1	20	20	4¼	+⅛	4 2 0
English Electric	1	Nil	Nil	6/3	—	... ...
do. do. Pref.	1	8	Nil	8/9	—	... ...
Gen. Elec. Pref.	1	8½	8½	24/-	—	5 8 4
do. Ord.	1	10	10	2 3/16	+1/16	4 6 7
Henley...	1	25	30	57/8xd	+6/8	5 2 0
do. 4½% Pref.	5	4½	4½	4¼	—	5 6 0
India-Rubber	1	Nil	Nil	11/8	—	... ...
Johnson & Phillips	1	10	—	36/3xd	+ 2/-	5 10 3
Siemens Ord.	1	7½	7½	26/3x d	—	5 14 3
Telegraph Construction	12	10	10	98	—	5 4 2

*.Dividends paid free of Income Tax.

The B.E.A.M.A.

Speeches at the Annual Dinner: Review of a New Monograph.

On November 20th the British Electrical and Allied Manufacturers' Association held its annual dinner at the Connaught Rooms. Lord Derby (president) presided over a distinguished gathering which included several members of the Government and leading technical and commercial men.

After an excellent dinner, during which Royal Artillery bandsmen discoursed music, and the loyal toast, the Right Hon. J. H. Thomas, M.P., Lord Privy Seal, rose to propose the toast "Electricity in Industry and Transport." Following a few quips at the expense of the chairman, Mr. Thomas said that the prosperity of the electrical industry was cheering to a Minister charged with seeking solutions of the unemployment problem. That industry was a challenge to the world and gave the lie to the belief that this country was down and out. The export trade was in a healthy state, and during the past seven months orders for heavy electrical plant to the value of £7,000,000 had been obtained abroad in the face of foreign competition.

The Home Market.

Then, again, although pessimists pointed to slackness in the home market, during the past seven months British undertakings had placed 12¼ million pounds' worth of orders for heavy plant. In the view of the Electricity Commissioners a sum of £100,000,000 should be spent on transmission and distribution systems during the next five years, so that in that field alone the electrical industry had a solid block of orders to fall back upon. Since 1927 the Central Electricity Board had placed contracts to an amount exceeding £10,000,000. There was every reason to think that the slight set-back in the index of production of electrical apparatus for home use was only temporary, and there were signs that our curve of electrical activity was rising in relation to most other countries. Expenditure upon electrical equipment was thoroughly economic; it led to immediate and continued employment and improved the country's economic equipment. It was easy to find work by spending money, but that was no solution of the problem. Ultimately the solution lay in the improvement of our export trade. Our high standard of living militated against the quoting of low prices in foreign markets. That standard could only be maintained by everyone doing his utmost, by the highest technical efficiency and by co-operative action. The greatness of this country in the past had been due to courage, tenacity, and self-reliance, and that was one reason for the prosperity of the electrical industry. While there were many ways in which a Government could and should assist, an industry must first help itself.

A "Raw Recruit's" View.

Responding to the toast, Sir Felix J. C. Pole, chairman of Associated Electrical Industries, Ltd., described himself as a "raw recruit" to the industry. He pointed out, however, that he was only one of a number who had left the G.W.R. to join the electrical industry; he particularly mentioned Sir Daniel Gooch and Mr. C. E. Spagnoletti. As a railway man he thought he knew something about competition, but after studying conditions in the electrical industry he had come to the conclusion that he was wrong. Although there was a popular impression that by combination the electrical manufacturers were managing to secure a satisfactory margin of profit, that was not the case. In addition to strong domestic competition, which indicated the need for closer co-operation, there was a tendency in some quarters to obtain quotations from foreign firms for use in beating down the prices of British tenderers. In the long run that procedure would not result in the best equipment or service. We lived in the most highly taxed country in the world, hours and wages were more onerous here than in many competing countries and the cost of social service was increasing. It was unjustifiable that foreigners could penetrate our home market while we found it so difficult to get into theirs. The industry was in need of similar protection to that which the Government was instituting in the case of the coal industry. They were prepared to make sacrifices to get export business to fill their factories, which, drawing a parallel with the railways, could be considered "excursion traffic." No railway could live by carrying all its passengers at excursion rates, but those rates enabled it to utilise productive capacity which would otherwise be wasted. If railway companies, municipalities, statutory supply undertakings, and other bodies forced down prices to the level of foreign quotations, which represented *their* excursion traffic, the industry could not survive. He asked the Government to revive and extend the Trade Facilities Act to afford the electrical industry facilities for financing large contracts at home and abroad. Sir Felix said that he was impressed by the skill and keenness of electrical engineers and their workpeople, and by the close co-operation which existed between the engineers and their customers. He had seen in America the potentialities of electricity, and he looked forward to rapid development in this country, aided by the activities of the Central Electricity Board.

"Our Guests."

Lord Derby then proposed the health of the guests. He drew attention to the strong representation of the Government at the dinner and, while wishing them the best of health individually, said he hoped for their early end collectively. Seriously, however, he sympathised with any Government which had to face the problem of unemployment. That problem was a national, not a partisan, question, and he was one of a growing body of people who, while not sacrificing their principles, were prepared to support any movement towards finding useful work for our unemployed. He was unable to mention all of their distinguished guests by name, but he coupled with the toast the name of Mr. Herbert Morrison, the Minister of Transport, and wished him success in the great tasks with which he had to deal.

Mr. Morrison, replying, said that for many years he had been keenly interested in the electricity supply industry and referred to his tuition by Mr. Robinson, the Hackney electrical engineer. He congratulated British electrical manufacturers upon their success in overseas markets, and said that he believed that if the same progress had not been made at home it was due not so much to foreign competition as to the slower rate of development. Recently in company with the Lord Privy Seal he had met representatives of the electricity supply industry to urge a speeding-up, and they were gratified by the helpful spirit in which their suggestions had been received.

Electricity in the Home.

Hundreds of thousands of houses were equipped for lighting only. That was all very well in its way, but an undertaking that was content with that state of affairs was not doing its job. It should be campaigning day in and day out to persuade private consumers to do what he (the speaker) had done in his own house, namely, to use electricity for lighting, cooking, heating, water heating, and many other purposes. One of the greatest problems was the cost of installation, and here the industry could learn from its progressive competitor the gas industry. By hire-purchase or rental, and even by taking some risk in capital expenditure, electricity undertakings must persuade domestic consumers to use electricity for purposes other than lighting. If there were people in the electricity supply industry still following the policies of "Safety first" and "High prices and quick profits" the sooner they got out of the industry the better. In spite of all, however, progress in this country had been remarkable. Between 1922 and 1928 the sales of electricity had risen by 108 per cent. In the last seven months 500 applications for consent to the erection of overhead lines had come before the Commissioners, and sanction had been given in the majority of cases. Since April last, the Commissioners had issued loan sanctions to local authorities to the extent of £10,000,000 for electrical purposes. Together with the Commissioners and the Board he was giving special attention to rural electricity supply. The work of the Board was proceeding more rapidly than had been anticipated, and already six schemes had been transmitted to the Board by the Commissioners. These provided for the establishment of 1,870 miles of 132,000-V lines, and it was estimated that during the next ten years over 4½ million kW of plant would be required.

The B.E.A.M.A. and its Critics.

Mr. V. Watlington (chairman of the B.E.A.M.A. Council) proposed the health of Lord Derby. In doing so, he made mention of the criticisms to which the Association was constantly subject. He said that it had been blamed by an important section of its customers—the railways—for quoting identical prices for similar articles, although he had found that before the railway amalgamation four railway companies charged exactly the same fare for the journey between London and Sheffield although the mileage was not the same. Now that two groups served Sheffield they still quoted identical prices. They had also been blamed by some of their municipal friends for quoting lower prices for export than at home; yet some of those same municipalities encouraged that practice when they placed orders with foreign firms which were quoting lower average prices in this country than they obtained in their own protected markets. No one, however, had ever criticised the Association's good fortune in having Lord Derby as its president.

Lord Derby, who was accorded "musical honours," briefly acknowledged the toast and the proceedings concluded.

A Comprehensive Industrial Survey.

THE monograph published this week by B.E.A.M.A.* is one of first-hand importance to all electrical engineers. It may be said to give a statistical cross-section of the whole supply and manufacturing industry, whilst at the same time "placing" it relative to other industries of the country and other countries of the world. The figures given go far to abolish uncertainty and enable manufacturers and others to plan ahead, and bring their productive capacity into line with market requirements. Taken in conjunction with the monograph on trusts some time ago from the same authors, it should make the British electrical industry one of the best documented and most scientifically guided in the world.

The Two Manufacturing Groups.

The first section deals with the economic configuration of the industry. The manufacturing industry is in the first place divided up into two groups:—(1) The heavy plant and equipment group, producing capital goods; and (2) the mass-production group, which is engaged almost exclusively in turning out consumption goods. The supply industry is in vital relationship to both groups since it forms the chief market for the products of group (1), whilst by reducing energy prices it is the main stimulant of markets for the second group. Taking group (1), this is engaged in manufacturing plant for the supply industry, for industrial electrification and for electric traction. As the dominant characteristic of electricity supply is a low rate of capital turnover, the result has been to concentrate attention on the capital installation itself. Quality and efficiency are then the determining factors, whilst depreciation, apart from obsolescence, has to be reduced to a minimum. Manufacturers in group (1) must therefore rely for their market not on the wearing out of old plant but on new schemes and extensions, and also upon rendering the old sets obsolete by the ever-increasing efficiencies of the new. Another factor which has operated to the detriment of this group of manufacturers is the call for larger and larger units. Not only does one 60,000-kW set represent a smaller purchase price than six 10,000-kW sets, but it also involves heavy initial capital expenditure on machines, processes and design data.

As a consequence of all these tendencies, there has been a marked check in the flow of capital into the manufacturing industry in spite of a large and steady growth of capitalisation in the supply industry. Figures given in the memorandum show the capital invested in electrical manufacture to have been almost stationary from 1905 to 1917 at about 40 millions, during which period the capital expenditure by supply undertakings rose from 60 to 95 millions. A somewhat lurid picture is drawn of what *may* happen if the consumer persists in his wicked ways, and by playing one firm off against another succeeds in securing an uneconomic price. The very limited number of firms in the country capable of handling big work may be brought together financially to form a combination under one control, after which it would be easy for such an amalgamation to form international agreements and limit competition to the very minimum possible. As an alternative to such trustification it is claimed, and supported by statistics, that co-operation among producers based on exact knowledge of the market and a more reasoned adjustment to economic changes reproduces the benefits of limitation of competition without its defects.

In the smaller products limitation of competition is difficult or impossible since they present no technical or financial obstacles to the entrance of new capital and fresh undertakings. In this group, mass production is the keynote rather than quality production, and price is the determining factor. Quality may command a slightly higher price, but seldom greater than 5 per cent. The market is a fairly steady one, trade depressions affecting it only slightly, owing to the fact that the output of electricity is moving upwards almost without interruption and all these products are necessary to the immediate consumption of electricity.

Industrial Electrification and Growing Production.

The question of power finance is then touched upon, and it is suggested that this may be of great importance in the future of the electrical export trade, and also in connection with national electrification, where capital is required for the conversion of the basic industries to electric drive. The section concludes with some notes on electricity supply from the manufacturers' point of view. It is urged that there is an optimum return on capital expenditure beyond which it is difficult to go and unwise to attempt, at least in the direction of high energy prices. It is possible to establish for a number of industries what may be regarded as an economic price for electricity, and the fact that this has not been generally quoted largely accounts for the backwardness of electrification in the basic trades. Greater capital expenditure on load building is strongly urged, and the possibility of future co-operation between the manufacturing and the supply industries is touched upon.

Chapter 2 deals with electrical manufacturing, starting with a section on production. Production on the whole has moved rapidly upwards in the last fifteen years, the 1928 figures being three times those of 1913 in value. During the last three years the curve of increase has shown a tendency to straighten out, but reasons are given for believing that this check is only a temporary one. The electrical section is easily the largest of the engineering group of industries with the exception of automobile construction, and it is actually responsible for more than one-third of the total output of all the engineering groups. During this period there has, however, been a notable change in the balance of products from heavy to light. Thus, in the period between the two Censuses of Production, 1907 and 1924, the output of generators, transformers and other power plant has trebled, but motors, cables and apparatus have increased by over four hundred per cent. Similar tendencies are even more noticeable in the United States of America, the actual figures being as follows:—

Increases from 1907 to 1924.

Great Britain			U.S.A.		
Heavy	Light	Total	Heavy	Light	Total
360%	413%	404%	283%	572%	540%

As regards productive capacity there is no reason for the statement which has been recently made that the industry is now fully employed and cannot add easily to its existing output. Figures support the belief that the industry is in a position to increase its production by at least 40 per cent.

A more detailed analysis of the variations in electrical trade show two cycles of prosperity and depression since the conclusion of the war. In general, trade conditions appear to affect the electrical industry with a time lag of one year, but there is one section which has moved steadily upwards without check, namely, switch and control gear. Summing up, the results show that consumption has increased by 170 per cent. since 1913, production by 190 per cent., and exports by 150 per cent., whilst production for home consumption alone has increased by 210 per cent.

Costs and Efficiencies.

Tables are next given showing the distribution and increases in the various costs of production. From 1913 to 1927 the increases were as follows:—Materials, 55 per cent.; factory and commercial expenses, 72 per cent.; labour, 116 per cent.; and taxation, 570 per cent. These increases are differently distributed in the various branches of the industry, being greatest in mechanical plant and least in meters. The taxation increase is, of course, the most spectacular and leaves that of labour far behind. As regards the latter, it is noted that since 1913 the tonnage of output has increased by 80 per cent., while the total man-hours worked has only increased by 37 per cent., so that the extra wages have been offset by an improved labour efficiency of something like 29 per cent. This can be attributed largely to bigger and better tools and equipment, to higher labour and managerial efficiency, and to an improvement in the industrial load factor.

Side by side with these changes in value and in tonnage there have been certain notable technical changes. The output from a given weight of plant has gone up, particularly in the heavy plant section, and the weight per kW of turbine sets which averaged 42.5 lb. in 1918 to 1920, averaged only 14.9 lb. in 1927 to 1928. At the same time efficiencies went up, and the average generating station now has exactly the efficiency of the 25 most efficient stations in 1922-23. The average improvement in seven years has been 31.5 per cent.

Prices per ton are found from the Board of Trade import and export figures; they rose from about £70 per ton in 1904, to £270 per ton (import) and £164 (export) in 1927. The difference between the last two figures is partly due to the difference in character, the imports including a bigger proportion of small machines and apparatus.

The Prices of Electrical Plant.

Combining price per ton with capacity per ton gives the result that total prices per kW have steadily declined since 1920 and are now less than half their then values, the most marked changes taking place in machines, condensers and instruments. Comparing so far as can be done with pre-war values, the average price per kW in 1928 was about 20 per cent. above that in 1913, as compared with a 40 per cent. increase in general wholesale prices. No allowance, however, appears to have been made for the growth in the mean size of the unit. These figures are regarded as sufficient evidence that there has not been any attempt to maintain prices at an unnaturally high level, and in further confirmation the prices paid by supply undertakings are quoted. Dividing total capital expenditure on generating plant by the kW capacity gave a total of £17.1 per kW in 1923, and £15.3 per kW in 1927, whilst the capacity added during the period worked out at only £12.1 per kW.

The main conclusions as to costs and prices are summed up by saying that costs of production have gone up by 82 per cent. measured in selling value, labour costs have gone up by 116 per cent. on the same basis, and taxation by 530 per cent., but there has been an increase in labour efficiency which has helped to offset these latter increases. The course of prices of the product measured on a tonnage basis is slightly greater than the increase in values, judging by the export figures. The cost of the product when measured per kW has moved steadily downward since 1920, and in the case of heavy generating plant the reduction has been greater than the average for all electrical goods.

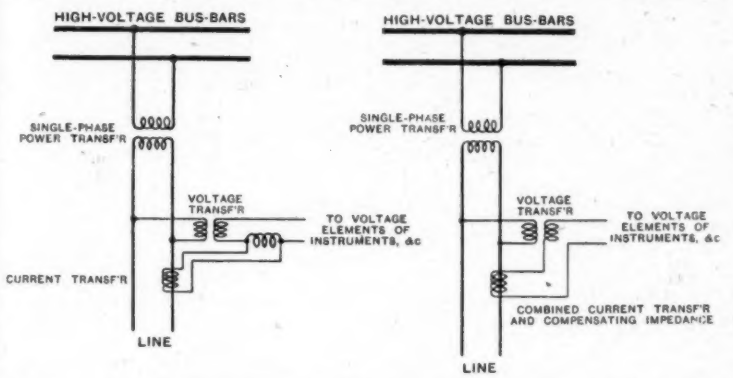
(To be continued.)

* "The Electrical Industry of Great Britain: Organisation, Efficiency in Production and World Competitive Position." London: B.E.A.M.A. Publication Department. Pp. 235 and diagrams. Price £2 2s. net.

Super-Voltage Measurement.

The British Thomson-Houston Co., Ltd., has introduced a method of measuring high voltage from the low-voltage side of a.c. systems, using "compensating" circuits to reproduce accurately the primary-circuit conditions.

ON Friday last a party of engineers, including consultants to the Central Electricity Board, witnessed demonstrations at the Rugby works of the British Thomson-Houston Co., Ltd., of that firm's method of accurately measuring high voltage from the low-voltage side of a.c. systems. The application of the scheme avoids the use of super-voltage transformers by connecting voltage transformers to the low-pressure side of a power transformer winding, and also by providing means by which errors due to power transformer regulation are compensated for. An impedance is placed in each phase on the secondary side of the voltage transformer whose primary side is connected to the low-pressure side of the power transformer. The impedance has a value proportional to the impedance of the power transformer, both in resistance and reactance, and is energised by a current that is also proportional to the load current passing through the power transformer, so that the compensating circuit represents exactly the conditions in the power transformer circuit. By this means, a voltage drop is obtained across the impedance that is proportional to the voltage drop in the power transformer under any conditions of load. Therefore, the voltage drop is suitable for correcting the secondary voltage error of the voltage transformer due to the regulation of the power transformer, and thus produces a compensated secondary voltage which is a true representation, both in phase and in magnitude, of the voltage of the h.v. side of the power transformer. Fig. 1 illustrates an elementary application of this voltage-compensation scheme to a single-phase power transformer circuit. It will be observed that the compensating impedance is energised by a current transformer connected in the low-pressure side of a power transformer circuit; it is, however, possible, and more often than not preferable, to combine the impedance and current transformer in a single unit, thereby simplifying the connections, as shown in fig. 2.



Figs. 1 and 2.—Elementary Applications of "Compensated" Method of H.V. Measurement.

It is the general practice for a super-voltage power transformer to have its windings star-connected on the high-voltage side and delta-connected on the low-voltage side. For this condition the impedance should be inside the delta of the low-voltage windings, and the voltage transformer should have its primary windings in delta and secondary windings in open star. This arrangement, of course, presents difficulties, and therefore a scheme has been evolved whereby the impedance can be connected outside the delta, as illustrated in fig. 3. It will be observed that the line current transformers and impedances are combined into single-phase units. Each unit is divided in two sections, so that the compensating impedances can be connected in zig-zag formation. Each half section is provided with an auxiliary winding excited from a current transformer connected in the neutral on the high-pressure side of the power transformer. The neutral point of the zig-zag connected impedances would always correspond to the centre of gravity of the low-voltage triangle; but this, however, would not correspond to the position of the neutral within the high-voltage triangle. The purpose of the auxiliary windings is to move, in effect, the neutral point of the impedances to a position corresponding to that of the high-voltage side. It is, of course, appreciated that the movement of the power transformer neutral is determined by the magnitude of the current flowing in the neutral, and accordingly a current transformer connected in this neutral would supply the requisite current to effect this change. Actually these auxiliary windings move the low-voltage triangle and not its neutral point, but the relative effect is the same as if the triangle were kept stationary and the neutral point moved within it. There are means by which the low-voltage neutral can be moved instead of the triangle, but such means involve complications in other directions which are eliminated by the method shown in fig. 3. It will now be readily understood that this method provides a triangle of secondary voltages with a neutral point that will under all normal and abnormal conditions of service correspond exactly to the high-voltage triangle and its neutral. In other words, the secondary voltages are always a faithful representation of the high-voltage conditions. Whether the current transformers and impedances are separate or combined into single units, the effect is always to introduce a constant value of impedance into the secondary circuit of the voltage transformer, irrespective of the compensating effect due to the load current through the power transformer. This constant impedance effect produces a ratio and a phase-angle change in the same manner as would be caused by any other impedance connected in the secondary circuit, and therefore the value of the impedances should be kept as low as possible. The only limit to this is the value of the current energising the impedances, for the lower the value of the latter the higher the current required. In order to obtain an homogeneous arrangement it is highly advisable for all the components to be designed and tested together.

The method demonstrated for "voltage-compensation" has been incorporated in every sub-station so far considered by the Central Electricity Board for the 132-kV national scheme. The "compensated voltage" so obtained is used for protective devices and for synchronising purposes. Another important order is for the application of "voltage-compensation" to the automatic regulation of high voltage generator-step-up transformer groups. It will be appreciated that the voltage applied to the voltage regulator can, with the inclusion of these "voltage-compensating" devices, be taken from the low-voltage side of the group. A further application for which an order has been received is for metering purposes on super-voltage circuits without the use of voltage transformers directly connected across such circuits.

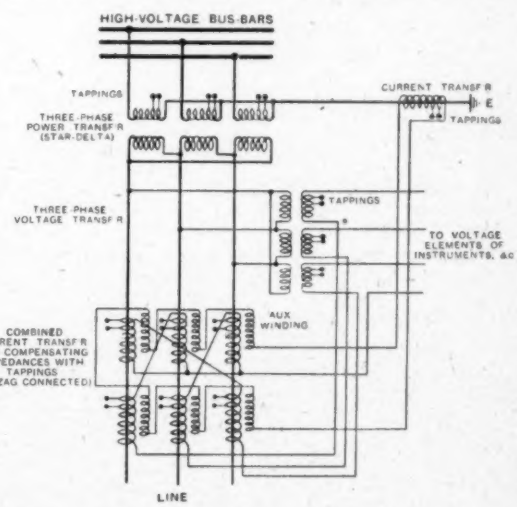


Fig. 3.—"Compensated" Connections on Three-phase Circuit.

The tests witnessed were representative of the actual service conditions, so far as values of the line currents and power

transformer reactance were concerned. The voltages, however, were on a considerably reduced scale, and that enabled direct readings to be obtained of the voltages on the h.v. side, so that the accuracy of the voltage readings obtained, *via* the compensating devices could be readily checked. The rating of the compensating devices corresponded exactly with that being supplied to one of the sub-stations for the South-Eastern electricity scheme of the Central Electricity Board. It was for a 15,000-kVA transformer bank, and the currents on the l.v. side were very low, imposing the most severe conditions as regards accuracy of the compensating device. The secondary of the voltage transformer was also loaded to correspond to service conditions. The test circuit is shown in fig. 4. The power transformer was rated at 75 kVA, 660/165 volts, and 10 per cent. impedance was obtained by the use of separately mounted reactors, not shown in the illustration; this provision was necessary on account of the difficulty of obtaining 10 per cent. impedance in so small a transformer. One set of voltmeters was directly connected to the h.v. side, giving a direct reading of the line and phase volts. A second set of voltmeters was operated by the voltage-compensating device, and these instruments were scaled to be direct reading for the h.v. side, and placed immediately under the corresponding voltmeters reading direct from the h.v. side. The accuracy of the voltage-compensating device was accordingly demonstrated by comparison of the two sets of phase and line voltmeters. Further, ammeters were connected in the l.v. lines and in the h.v. neutral, and a power factor indicator was also provided to indicate the power factor of the load on the l.v. side of the power transformer.

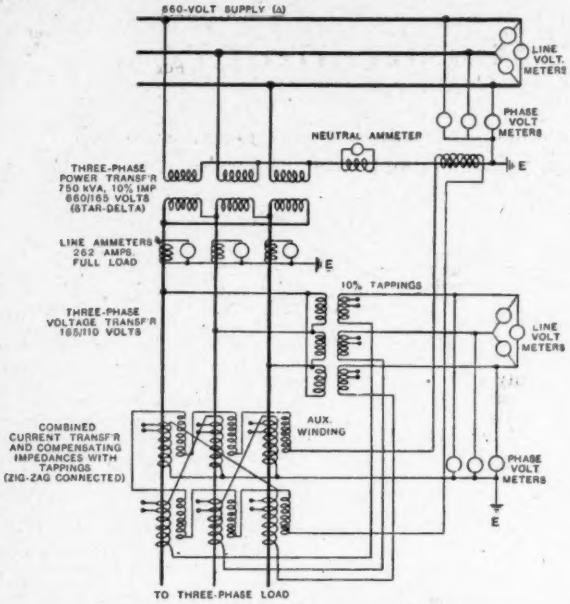

660-VOLT SUPPLY (A)
LINE VOLT METERS
PHASE VOLT METERS
NEUTRAL AMMETER
E
THREE-PHASE POWER TRANSF'R 750 kVA, 10% IMP 660/165 VOLTS (STAR-DELTA)
LINE AMMETERS 262 AMPS. FULL LOAD
10% TAPPINGS
THREE-PHASE VOLTAGE TRANSF'R 165/110 VOLTS
AUX. WINDING
COMBINED CURRENT TRANSF'R AND COMPENSATING IMPEDANCES WITH TAPPINGS (ZIG-ZAG CONNECTED)
TO THREE-PHASE LOAD

Fig. 4.—Circuit of Demonstration Apparatus.

Tests under various mains and loading conditions were taken, and the readings obtained were very convincing. With normal conditions on the supply mains and the secondary side of the power transformer "shorted" (3 lines), both the direct reading instruments and those operated *via* the compensating device read 650 V. With the compensating device out of circuit the latter instruments read zero. With the secondary side of the power transformers "shorted" across two lines the respective phase readings on both sets of instruments, line and "compensated," were 800, 700 and 650 V, with the compensation in circuit. With the supply mains "earthed" on one phase, the respective "line" and "compensated" voltmeter readings again agreed, the voltage of the earthed phase being zero and that of each of the other phases 200.

Low-temperature Coal Carbonisation.

An outline of practice in England, America, and Germany, with special reference to the combination of the process with the production of electricity.

(Report of a joint meeting of the Institution of Electrical Engineers *and the* Institute of Fuel.*)*

At the joint meeting of members of the Institution of Electrical Engineers and of the Institute of Fuel in London on November 21st three introductory papers were presented (in abstract) and discussed, all of them dealing with the possibilities of combining the low-temperature carbonisation of fuel with the production of electricity, the papers being indicative, respectively, of English, American and German practice.

Col. Sir Thomas F. Purves, O.B.E., president of the I.E.E., occupied the chair.

English Practice.

(Summary.)

By E. H. Smythe, A.M.Inst.C.E., and E. G. Weeks.

Great Britain being dependent almost entirely upon coal for the production of electricity (the amount of water power available being comparatively small) the inauguration of the "grid" transmission system and the co-ordination of power production afford favourable conditions for combining the latter with the distillation of coal.

The Babcock process of low-temperature coal distillation is briefly described; so far as the authors are aware, it is the only process of its kind developed in Great Britain. It is suggested that the electric power plant of the future will take in coal as its raw material, but will deliver, in addition to electricity, motor spirit, fuel oil, creosote, pitch, and other derivatives of coal tar. A discussion of the actual results obtained from the coal distillation plant at Dunston-on-Tyne follows. It was designed for the production of an ideal power station fuel, low in volatiles and therefore smokeless, and for the recovery of the more valuable by-products consistent with the production of such a fuel. The broad result obtained is that 16 gallons of tar oils and ¾ ton of semi-coke are produced from 1 ton of Northumberland small coal. The authors discuss the potentialities of low-temperature tar and explain that investigation of this aspect of coal distillation is by no means complete. The field of research is said to be one which presents wide possibilities. A full description of the plant at Dunston is given as an appendix to the paper.

It is claimed that a new situation exists in which a practical process of coal distillation has been evolved in conjunction with the generation of electricity. Development has been carried out primarily for the better utilisation of the constituent parts of raw coal, but there are also the prospects (*a*) of cheapening the unit of electrical energy, and (*b*) of providing a smokeless fuel which has proved itself to be eminently suitable for burning on a large scale in boiler furnaces. A good deal of success has recently been achieved in improving the combustion of raw coal, but all the energy has been confined to that one direction. Under the new conditions, the advance which has been made will be consolidated and combined with better utilisation of the raw coal and the production of an improved boiler fuel.

The claim is based upon results obtained during three years of continuous operation under day-to-day working conditions. The plant has, moreover, two important advantages: first, it occupies little ground space, and, secondly, it can be conveniently worked in with the design of the boiler house plant of a modern power station. The further conditions of reasonable first cost, reliability, and low working cost, have also been met. Details of first cost are not included in the present paper.

Having regard to the practical and technical efficiency claimed for the process, progress made up to the present time, measured in terms of the tons of coal distilled per day, is disappointingly small. The fact must be admitted, but the explanation is fairly simple, for new industrial processes are notoriously slow in establishing themselves against old and well-tried methods.

American Practice.

(Summary.)

By S. McEwen, A.R.S.M., F.Inst.F.

Consideration is given to the possibility that the pre-treatment of coal with the recovery of by-products may secure an economic advantage in the production of electricity in the United States of America. Reference is made to the trend of of opinion of power station engineers and to the great interest which is maintained in the subject.

The economic possibilities are reviewed, and stress is laid on the necessity for securing maximum revenue from the sale of such gas as is produced by the process of pre-treatment, and it is claimed that this result can be obtained only by

co-operation with public service companies supplying gas to domestic and industrial concerns.

The installation of the McEwen-Runge process at the Lakeside station of the Milwaukee Electric Railway & Light Co. is described, and an account is given of its development so far as it has been continued in America, the earlier experimental work which originated in England being omitted. Particulars are given of the progress which has been made, together with an indication of the direction which future development will follow.

It is desirable that the economic possibilities of the pre-treatment of coal should be realised and the conditions which are essential for commercial success should be clearly understood, for a process which is both technically and commercially successful when applied to domestic fuel might not be commercially successful if the solid fuel were utilised for power production instead. Fuel for the former purpose can be sold at a high price, generally very much higher per unit of weight than that of the coal from which it was produced, but the power-station engineer is more concerned with heat units; he is not so much concerned with the physical condition in which the fuel is supplied to him. The revenue obtained from the sale of the liquid and gaseous by-products has to pay the whole cost of pre-treatment and, after an allowance for the loss of weight of the solid residue, as compared with the original coal, provide an adequate profit to warrant the undertaking. It is for this reason that a low-temperature process operated in conjunction with a plant for electric power generation has a much smaller margin for profit than is the case with low-temperature processes which yield, as one of the main products, a high-grade domestic fuel.

It may be said that it is not necessary to develop a low-temperature carbonisation process in order to give effect to an alliance between electric power and town gas undertakings, and it is possibly doubtful whether so much interest would have been taken by power-station engineers in low-temperature carbonisation were it not for the fact that the coke produced by high-temperature processes is not favoured by power-station engineers as a fuel. The justification for the development of low-temperature carbonisation in this connection lies in the fact that semi-coke is an ideal fuel for combustion, while the net revenue from the by-products of a low-temperature process promises to be greater than that from the by-products of a high-temperature process.

In designing the McEwen-Runge process the objective aimed at was a system which would have a very high capacity per unit, could be constructed cheaply, and could be operated with a minimum of labour; it was further decided that it would be necessary to produce town gas for sale. The process consists in carbonising pulverised bituminous coal while that coal is in suspension in a hot gas. In practice the pulverised coal from the ordinary preparation plant of a pulverised-fuel-fired power station is intercepted on its path from the preparation house to the boiler house and is allowed to fall by gravity in a shower through a vertical tower up which heated gases rise, so that there is an exchange of heat from the gases to the coal, with the result that carbonisation is effected. By this system it is possible to reduce the time normally required for carbonisation from hours to seconds, making it possible to secure very high capacity from a relatively small plant. The resultant carbonised residue, being still in a finely-divided condition, is available for supply to the boilers where it can be burned as pulverised fuel.

For the pre-treatment of coal in conjunction with power generation it has been said that the plant should be capable of being operated at varying capacity to suit the hourly demand for power, or, alternatively, that pre-treatment plant could only be applied to a base-load power station. This, however, is scarcely the case, since the pre-treatment plant can be operated at a uniform capacity per day of 24 hours, variations in demand for power being provided for by storage bunkers, for the pulverised semi-coke can be stored indefinitely and is unlike pulverised raw coal in this respect. The variation in demand for town gas, which follows very closely the variation in demand for electricity, can also be provided for by adequate holder capacity. Seasonal variations can, of course, always be allowed for by having a sufficient number of units in the pre-treatment plant, one or more of which can be put out of commission during the season of light load.

It is an interesting fact that at the present time in the large American towns the demand for gas and the demand for electric power bear such a relation to each other that the demands are met by the yields of gas and power which it is possible to obtain by the pre-treatment of coal.

German Practice.

(Summary.)

By PROF. P. ROSIN, DR.ING.

The paper deals with the economics of the production of power and valuable by-products from brown coal, which is very plentiful in Germany, but has an extremely low calorific value. The pit coal is similar to that in England, whilst brown coal is very inferior until it has been treated in order to improve its quality. It contains from 50 to 60 per cent. of water and from 3 to 10 per cent. of ash, and its calorific value is only about 1,800 to 2,500 kg.-cal., but it can be obtained so cheaply from very large open workings that its cost per calorie at the mine is much lower than that of pit coal. On account of its high water-content the transport of raw brown coal to any distance is uneconomic; therefore, it must be dried and converted into briquettes containing about 15 per cent. of water, whereas the transport of pit coal over long distances is rendered possible owing to low railway tariffs and favourably situated water-highways. For these reasons the production of electricity in Germany proceeds along two different lines: first, there are the pit-coal power stations in the coal-bearing areas themselves, and in all those districts where no other economic fuel is available; that is, at the collieries and in most of the municipal electricity works; secondly, there are the brown-coal power stations in the immediate vicinities of the large open workings being developed under Government or industrial control for overland distribution. As most of the German power houses have to operate with cooling towers, and as there are enough small rivers in the neighbourhoods of the brown-coal districts to supply sufficient water, the main consideration in the planning of steam power works is the transport of fuel and electricity. On account of the low cost of production of brown coal, the works using it have in recent years gained a considerable advantage over those dependent upon pit coal. Whilst only 23 per cent. of the electricity produced in Germany during 1914 in public works was generated from brown coal, the percentage had increased in 1922 to 41 per cent., and at present is probably over 60 per cent.

The total production of public electricity works in Germany in 1928 increased to approximately 14,500 million kWh. A similar amount is being produced each year in industrial power plant, so that the total production in Germany this year will probably exceed 30,000 million kWh, corresponding to about 500 kWh per head of the population. Of the 30,000 million kWh referred to, the public and industrial brown-coal stations produced about 10,000 millions, and for this purpose consumed from 25 to 30 million tons of brown coal. The six most important German electricity works using brown coal produced some 6,000 million kWh per annum, the plant installed in them being of 2,050,000 kW capacity, and consuming from 18 to 20 million tons of raw brown coal. The tendency in Germany is to concentrate production in large stations. Although the production of brown coal already amounts to 170 million tons a year, it will be available in Germany for several hundred years as a cheap fuel, whilst the cost of mining pit coal will probably become greater on account of the increasing depth from which it must be obtained and the fact that underground working is becoming more expensive. The country is entirely devoid of natural oils, so that the study of low-temperature carbonisation is of as much interest to Germany as it is to England. New large low-temperature carbonisation plants which have attained full production are, taken together, now treating about 3,000 tons of raw brown coal per day, and the first really large low-temperature plant in the world has started in Wölfersheim. It was originally intended as a means of producing oil, tar being the main product, whilst the semi-coke and gas were regarded as by-products. This view has undergone a complete change on account of the many economic failures of processes using German coal, which does certainly not contain sufficient tar for its sale alone to cover the cost of carbonisation, and the author believes that this is true for all countries except for Cannel coal, which is, however, only found in small quantities. The profit on the low-temperature carbonisation of pit coal must therefore be derived from the sale of semi-coke; besides being a smokeless lump fuel, it sells as artificial anthracite for domestic purposes at much higher prices than those obtained for raw coal. The economic utilisation of the gaseous products is now attracting considerable attention, but has not assumed any practical significance in Germany. Co-ordination between low-temperature distillation and the production of electricity is only remunerative, generally, if, on account of the revenue derived from carbonisation, the cost per unit becomes less than when the most reasonably-priced fuel the electricity works concerned can purchase is used. This means that the initial cost of the complete combustion plant must be so low that the semi-coke which is burnt under the power-station boilers will be cheaper than any other competitive fuel the power works could use. No power station will ever pay the same price for semi-coke as will the domestic market, and it does not necessarily require a large smokeless fuel, as it could probably purchase those classes of coal which are unsuitable for low-temperature carbonisation at a price lower than that which the carbonising plants would have to pay for their supplies. An electric power station combined with a carbonisation plant using pit coal can therefore only be considered economic if a non-coking coal contains so much tar and gas that its sale would cover all the capital charges and working expenses of carbonisation, besides leaving an adequate profit without any increase in the fuel costs to the boilers. Hitherto such pit coal has not been found in Germany, and for that reason German pit-coal carbonisation power stations cannot be operated on a remunerative basis until the initial costs of the carbonising plant have been reduced to a fraction of those obtaining at present, or until totally different price conditions obtain in the oil market.

The low-temperature carbonisation of pit coal in Germany is at present only possible for the production of semi-coke for domestic purposes, and the plant at the Mathias Stinnes colliery at Karnap is the only large plant working economically in Germany; it operates on the K.S.G. (Kohlenscheidungs-Gesellschaft) system, similar plants having also been erected, or being in course of construction, in England and America.

The independent pit-coal carbonisation plants known to the author cost on an average £250 per daily ton of raw coal

through-put, one ton yielding about 16 cwt. of semi-coke, the calorific value of which is approximately 7,000-kg.-cal. If the power station operates with the highest fuel economy, 1 kg. of semi-coke will at most produce 2 kWh, corresponding to 1,600 kWh per ton of carbonisation coal. The installation of a carbonisation plant in connection with a power station therefore means an increased capital cost of at least £3 5s. per kW installed, but in most cases even more. The whole of the charges due to this extra capital cost, together with the working expenses, would have to be covered by the profit derived from the tar and gas. For this reaeson all the important projects relating to low-temperature carbonisation power stations using pit coal in Germany have had to be postponed, as they offer no prospect of remunerative operation at present, and only in special cases could non-independent carbonisation plant directly connected to boilers be considered, the capital cost of which would not have to exceed about £75 per installed daily ton of raw coal through-put.

The position as regards German brown coal is, however, quite different, the tar and not the coke being the main product of carbonisation, as the value of the tar is more than 2½ times that of the coke. The carbonisation must be preceded by some drying process and, as the raw coal is broken up previous to drying and breaks up still further during the carbonising process, the semi-coke obtained will all pass through a 10-mm. mesh screen. The whole of the ash of the raw coal is transferred to the semi-coke, so that the ash content of the coke is between 20 and 40 per cent., but it is a free-burning smokeless fuel. It has, however, a great tendency to self-ignition. The gas has a calorific value of 4,000 cal. per m.³, but in this condition it contains up to 40 per cent. of CO_2 and 10 per cent. of H_2S. If purified its calorific value is 8,000 cal. per m.³.

In 1928 about 2½ million tons of brown coal was carbonised, giving 522,000 tons of semi-coke. This year a 20 per cent. increase is to be expected. This year no new carbonisation plants have so far been built or ordered in Germany; after some years of rapid expansion it is now necessary to call a halt, during which the newly erected plants must be adjusted for efficient operation and a close study of detail made. At the same time, the development of the market conditions has to be awaited and the effect of the sudden increase in production noted. Whilst the future development will be favourably affected, owing to the fact that the new hydrogenating processes enable brown-coal oils to be transferred in bulk into motor spirit, the position is not yet clear as to what effect the increased production of paraffin will have on the German market, which is now almost saturated by the present output. On the other hand, the gas produced has now been successfully purified by the elimination of CO_2 and H_2S, due to pressure washing, so that it can be used for town gas supply. The Edderitz mines near Koethen are now supplying the surplus gas from the carbonisation plant to Dessau for the Continentale Gasgesellschaft, which is the first long-distance gas transmission of this kind and has been in successful operation for several months. The marketing of the increased quantities of semi-coke produced by this means has now become a difficult problem. This fuel is used in special stoves in small amounts for domestic purposes more particularly by the poorer classes of the population. This source of disposal, however, cannot be further developed; it has, in fact, decreased somewhat in recent years. It has not, so far, been possible to make briquettes from brown-coal semi-coke on an economical basis, and the gasification of the very fine coke breeze containing a high percentage of ash is also a difficult matter. It is, therefore, necessary to endeavour to introduce it as an industrial fuel for steam boilers or furnaces, and recently suitable travelling grates have been constructed which give successful results. The burning of the coke in pulverised form can only be satisfactorily adopted if the coke is dry-quenched, as wet coke cannot be pulverised and the re-drying of it increases the cost beyond economic limits. Dry quenching obviates at the same time the dangerous tendency to self-ignition; even so, the pulverising of brown coal semi-coke is by no means easy, as the output of the mills is less than when raw coal is being ground, in addition to which the wear and tear is very heavy.

The use of the new large carbonisation plants calls for an immediate solution of the problem of waste liquor disposal, containing as it does sulphide of hydrogen, phenols, and fatty acids, in addition to ammonia. This waste liquor cannot be run to waste unpurified, but the author's recent work has shown one way of purifying it and removing the phenol content.

The necessity of reducing capital cost and working expenses is daily becoming more obvious, as the coal deposits which are rich in tar and can be obtained cheaply in open workings are now becoming exhausted. It is therefore necessary either to carbonise the brown coal containing a low percentage of tar which is available from open workings, or to adopt mining methods for obtaining the richer brown coals, in which case the cost is fully twice as great. The cost of the raw material is the most important factor to be taken into account in estimating the earning capacity of a carbonisation plant, particularly as the fuel contains 50 per cent. of water, which must be removed.

The capital cost of a new raw brown-coal power station in Germany is about £12 10s. to £15 per kW installed. The addition of a carbonisation plant would increase this capital cost by approximately £12 10s. to £17 10s. per kW, depending within these limits on the yield of semi-coke, its calorific value, and the consumption of the power plant to which it is attached. On account of this high extra capital cost only base-load power stations can be considered as suitable for such combinations. Assuming that such a plant operates for 3,500 hours a year, a tar yield of 7 per cent. from the raw coal makes the revenue from electricity about twice the tar value, on the basis of present tar and energy prices. In this connection it must also be remembered that the price of energy is much less subject to fluctuation than the price of tar. The market price of electricity is, in all probability, the most stable of all market commodities, whilst the oil market is subject to violent fluctuations. For this reason the profit from a carbonisation power station must be built up in the first place on the basis of the supply of electricity, which must be ensured in such a manner that fluctuations in the price of oil would not endanger the general economic stability of the works.

Theoretically, extraordinarily close coupling of the individual portions of the plant is possible, enabling an exceptional economy of fuel to be obtained, together with full utilisation of nearly all the products in a reciprocal manner. In practice, however, the coupling should not be on too rigid lines, even at the cost of a somewhat higher heat consumption. Difficulties are unavoildable in all plant, and the resultant losses affecting all branches of the works are not necessarily counterbalanced by the attainment of the highest possible thermal efficiency. For this reason, carbonisation power plant should, in the first instance, be a combination of carbonisation and power production from the point of view of space and profit, the operating standpoint of the combined plant being a secondary consideration. This principle will have even greater significance when the coupling becomes a triple one, that is, when carbonisation plant, power station, and gas works are combined, to which end Germany is at present making preparations.

Discussion in London.

Most of the speakers in the subsequent discussion congratulated the authors on the candid manner in which they had dealt with the two processes in use in England and the U.S.A. and the general situation in Germany.

Mr. W. M. SELVEY, who opened the debate, as a member of both Institutions, voiced the Institute of Fuel's appreciation of the joint gathering, remarking that such meetings were becoming increasingly necessary. He drew attention to the need for the co-operation of the industries interested in the subject under discussion, which could be between (*a*) power + chemicals, (*b*) power + chemicals + gas, (*c*) power + chemicals + gas + domestic fuel, with a view to the provision of a "common financial umbrella." Such combination was possible in the U.S.A., but not in England, where statutory undertakings operated, unless a new spirit was born. It was significant that, although the Dunston plant was situated in Durham, Northumberland coal was used. The process resulted in the up-grading of fuels and also of the gas produced.

Dr. A. T. DE MONILPIED expressed the opinion that, while at present the gas produced was regarded as the most profitable commodity, ultimately the oil product would be the most important. The semi-coke gave more radiant heat than the original coal, and tests of the main boiler at the Worcester Corporation electricity generating station had shown that its use resulted in greater evaporation, higher furnace temperature, lower flue-gas temperature, and smaller sulphur content, which considerations should influence the situation materially.

Dr. C. H. LANDER thought combination would ease power production by enabling the design of cheap plant of a large through-put, but the economic aspect was not so clear, as the power producer would lose if there was no union between electricity and other industries. The process did not result in any appreciable increase of the commodity value of the solid fuel and gas produced, so only the oil was left if a price could be got for it. His staff had tested the Dunston plant and, although the report had not yet been issued, he could confirm the authors' figures. It had been said that coke made in externally-heated retorts was more difficult to burn, as it became graphitic, which term meant nothing at all. X-ray examination had indicated the presence of the so-called graphitic characteristic in all specimens, but there did appear to be some parallelism with the size of the colloidal molecule.

Mr. NIELSON said that in the McEwen system it seemed to be wrong to grind the coal first, which involved grinding also some 30 per cent. of unwanted residue. It should be carbonised first, then quenched if desired, and ground afterwards. He had been told that in Germany some difficulty had been caused by the growth of cast iron closing up the corrugations of the coke-supporting and extracting gear in the retorts.

Mr. S. MCEWEN, in reply, stated that, while semi-coke had many advantages as a fuel, he could not claim that its fuel value per B.th.u. was higher than that of coal. The reason why the coal was ground first was because the heat transmission was thereby made more rapid at a low temperature head, resulting in the carbonisation time being reduced from hours to seconds.

Prof. P. ROSIN explained that retort trouble had been overcome by the use of steel in place of cast iron. He briefly outlined his method of removing the phenol content of the waste liquor.

Mr. E. H. SMYTHE said that the external heating of retorts was the only subject touched on in their paper of which they had no personal experience, but their remarks were based on serious experiments made in Germany.

Mr. E. G. WEEKS said that all their experiments were made with non-coking coals. He could not claim an increase of evaporation due to the use of semi-coke.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A New Floodlight Fitting.

The floodlight fitting depicted in fig. 1 was exhibited for the first time at the recent conference of the Association of Public Lighting Engineers at Bournemouth. It is a product of METRO-VICK SUPPLIES, Trafford Park, Manchester, and is built with a view to providing a lighting unit giving ample and evenly diffused illumination conjunctly with high

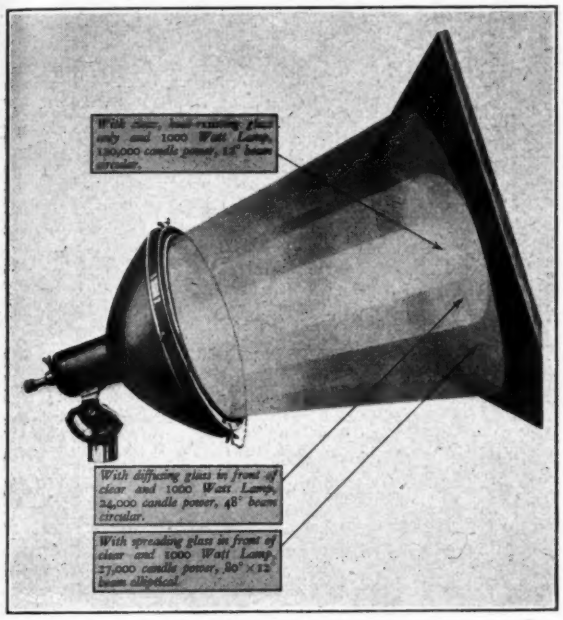
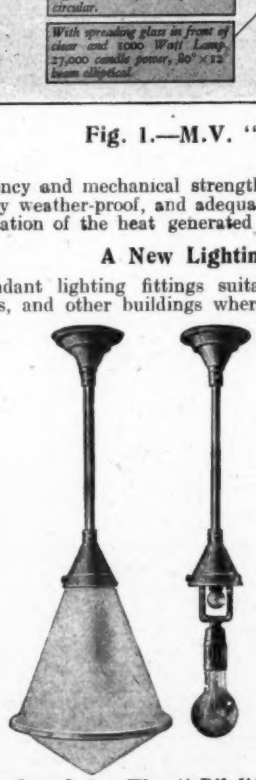

With clear, heat-resisting glass only and 1000 Watt Lamp, 130,000 candle power, 15° beam circular.
With diffusing glass in front of clear and 1000 Watt Lamp, 24,000 candle power, 48° beam circular.
With spreading glass in front of clear and 1000 Watt Lamp, 27,000 candle power, 90° × 12° beam elliptical

Fig. 1.—M.V. "Floodray."

efficiency and mechanical strength. It is claimed to be completely weather-proof, and adequate provision is made for the dissipation of the heat generated by the lamp.

A New Lighting Fitting.

Pendant lighting fittings suitable for hospitals, nursing homes, and other buildings where a subdued light or emergency lighting is desirable, have recently been introduced by KORTING & MATHIESEN ELECTRICAL, LTD., 711 and 715, Fulham Road, S.W.6. These fittings are provided with two lampholders, one B.C. or E.S. for the larger lamp providing general lighting, and one B.C. holder wired independently for a smaller wattage lamp (10-15 watts). The metal parts are finished white enamel, and the rod of the pendant fittings is dull nickel plated. The smaller lamp will provide, if suitably wired, a pilot light which may also be used as emergency lighting if connected to an independent source of supply. The upper globe is of clear glass, satin finished, and the lower bowl of opalescent glass; the greater portion of the light is thus directed on to the ceiling and reflected, avoiding glare. The fittings are provided with two standard lengths of pendant tube, *viz.*, 16 in. and 32 in. There are two patterns, No. 665 being for lamps of 60-100 W and No. 654 for 100-200 W. The accompanying illustrations, figs. 2 and 3, show pattern 654 complete and with the globe removed.



Figs. 2 and 3.—The "Pilolite" Fitting, Complete and with Globe Removed.

An Anti-dazzle Lamp Lens.

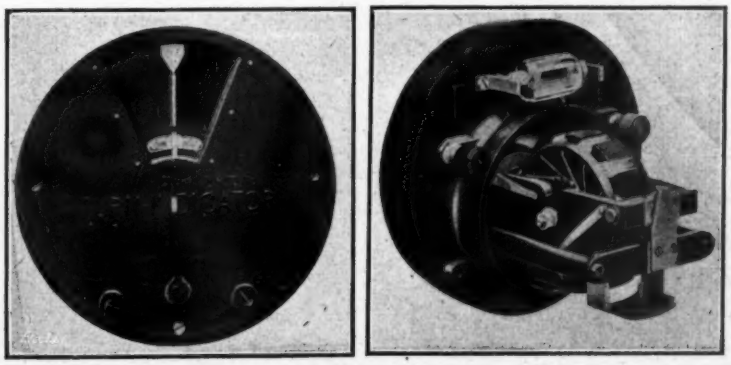
A recent introduction of the EARTHING CLIP CO., 71, Hatherley Street, Princes Road, Liverpool, is an anti-dazzle motor lamp lens which can be fixed into any existing lamp in a few minutes, and thereby make it glare-proof. The electric lamp is visible through the lens in a magnified form, and is controlled by a combination of prisms, which, it is claimed, completely absorbs the dazzle.

A New Flexible Coupling.

The POWER PLANT CO., LTD., West Drayton, Middlesex, has recently introduced a new flexible coupling, the design of which is claimed to offer many points of interest. It is an all-metal flexible coupling in which the elastic elements consist of straight spring-steel bars which are mounted in a carrier ring, the ring in its turn being freely supported on a spherical extension of one of the coupling bosses. The ring can accommodate itself to mis-alignment, either of off-set centres or inclination of shafts. The coupling is fully lubricated by grease under pressure, and performs its work silently and with extremely little wear to the working parts.

A Gyroscopic Turn Indicator for Aeroplanes.

An interesting device on view at the recent Aviation Exhibition at Olympia was the Schilovsky-Cooke electrical gyroscopic turn indicator for use on aeroplanes which has been introduced by AIRCRAFT PATENTS, LTD., 4, Broad Street Place, London, E.C.2. The maintenance of an accurate course while flying through clouds, on dark nights, or over the ocean when no horizon is distinguishable is largely dependent upon the use of a device of this kind. It is of course possible to fly in these conditions with the aid only of the air speed indicator, lateral bubble level, and compass; but such flying makes great and harmful demands upon the pilot's concentration. The Schilovsky-Cooke turn indicator, figs. 4 and 5, is designed to expose a band of red light when the aeroplane turns to the left and a green light when it turns to the right. The extent of the light exposed indicates the rate of turn, small deviations being indicated by a narrow slit of light. The instrument is luminous, so that it can still be read if the lamp fails. The gyroscopic principle is employed in the instrument, the gyro wheel consisting of a small electrically-driven armature mounted on ball bearings and running at about 1,200 r.p.m. The apparatus is operated off the aeroplane lighting battery, the current required being only 0.8 A, 12 V, by day and 0.6 A by night. A special damping device prevents



Figs. 4 and 5.—Front and Rear Views of Schilovsky-Cooke Indicator.

the instrument from signalling the slight regular swing from side to side common to most aeroplanes. It consists of an arrangement of air dashpots, one taking charge of the gyro and another of the cross level screen. The apparatus measures 5 in. by 4 in. and weighs just over 2 lb.

An Electric Paint Stripper.

The Electric Heating Co., George Street, Croydon, has just put on the market a very simple, but useful, appliance for stripping paint off doors and boards.

The "Elect" electric paint stripper consists of an electric element enclosed in a casting of Admiralty brass having a bottom plate of steel. The loading is in the neighbourhood of 80 watts. The bottom plate is brought to a sharp edge, and should this by accident come in contact with a hidden nail a new plate can be fixed at the cost of a few pence. From the element running up a steel tube into the handle, which, by the way, is set off from the cast element chamber to prevent the hot paint falling on to the hand when in use, are the connections which are protected by fish spine beads, the ends of the leads being connected to the terminals at the top of the handle; from these terminals a light but strong tough-rubber flexible is fitted of about 16 ft. in length.

The stripper is constructed in such a manner as to reduce labour to a minimum. No advantage is gained by forcing the tool along the surface to be cleaned; hardly any pressure need be applied to the mouldings, which owing to their construction cannot be stripped of paint, but can be ironed with the stripper tool and followed immediately with an ordinary shave hook. The angle at which the stripper is held against the paint depends entirely on the thickness of the coat to be removed, also the condition of the paint, but to find the angle is by no means difficult and a few runs over the paint will soon reveal which angle is best.

A Fuse-Wire Container.

Messrs. McNair Kirk, 595, Dumbarton Road, Partick, W., have sent us a sample of the "Reddy" fuse-wire container, fig. 6, which they have just introduced. It measures 2¼ in. by 2 in. and contains two separate fuse-wire spools, which are totally enclosed and from which the wire is drawn through bushed holes in the container. The ends of the case are removable, so that refills can be inserted with ease. "Before renewing fuses, main switch must be placed in off position" is a useful caution carried on the device.

An Electric Graining Machine.

Messrs. Guy V. Laycock, Ltd., 12, Cloth Hall Street, Manchester, have recently introduced an electric graining machine for use in the decorating trade. It is claimed that this machine has been subject to tests extending over two years, and that it has been proved to be the quickest and best method of mechanical graining yet introduced. In the hands of a skilled grainer a surprising amount of work is accomplished in a very short time, and the results are not only pleasing from an appearance point of view, but are permanent, as the cutters engrain or "tattoo" the wood. The machine can be held in the hand for long periods without fatigue, and it is efficiently earthed in accordance with Home Office requirements. A sand-papered wheel can be attached in a few seconds, and this is particularly suitable for awkward corners, fillets, and so on.

An Electric Drink Mixer.

The accompanying illustration, fig. 7, shows the new No. 10 electric drink mixer which has been introduced by Messrs. S. G. Leach & Co., Ltd., 26-30, Artillery Lane, and embodies many improvements. A special feature is the simplicity of operation. The cup slides comfortably along the column, and the motor starts instantly. Of particular importance as a selling point is the beauty of the design and finish. The standard finish is white enamel, but the mixer can be supplied in jet black, jade green, or ivory. A No. 2 mixer embodies similar features, but is finished in nickel-plate.

Fig. 6.—The "Reddy" Container.

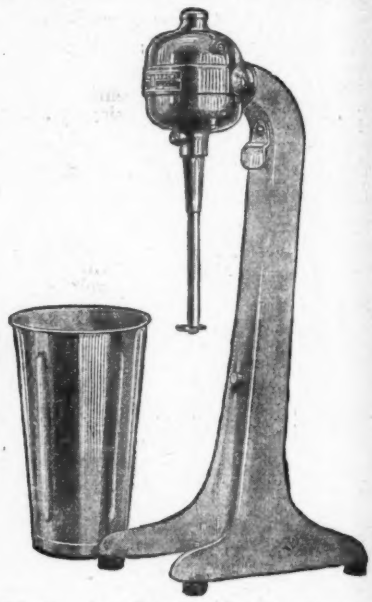


Fig. 7.—A "Leach" Drink Mixer.

Standard Intermediate Voltages.

A discussion of the relative merits and de-merits of various intermediate voltages from the point of view of rural electrification.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

(*Report of a meeting of the* Overhead Lines Association.)

VOLTAGES of 132 kV and 33 kV have been standardised by the Central Electricity Board and 400/230 volts by the Electricity Commission. In order to obtain cheap supplies of material for rural electrification work it is essential to standardise one (and one only) intermediate voltage, so as to encourage the mass-production manufacture of switchgear, transformers, &c. The need for a standard is of considerable importance both to manufacturers and to electricity distribution undertakings.

For many years intermediate pressures have been adopted that permit of economical tapping for the benefit of small and isolated consumers, and thus avoid the prohibitively expensive and unwise method of tapping the main e.h.p. lines. The intermediate pressures started at 1,100 volts, gradually rising to 2,200 and 3,300 volts, air-break switchgear only being employed. At the latter pressure a very considerable amount of work has been done, resulting in the adoption of 6,600 volts without any untoward trouble or resource to oil-break switches. Later experience justified 11,000 and 15,000 volts; in fact, air-break switchgear is now utilised in connection with many miles of 33,000-volt lines.

As well as the necessity of serving isolated consumers, there is also the seasonal demand of those consumers for the operation of large threshing machines, stone breakers, electric ploughs, &c., which can of course only be economically supplied if the sectional area of the transmission-line wire has not to be unduly increased above that required to comply with a reasonable margin of safety for mechanical strength. The higher intermediate voltages permit of this, and are generally used in conjunction with portable transformer wagons equipped with meters, switch, and protective gear. While permanent connections to intermediate-pressure lines are quite satisfactory, some further investigation is needed in connection with temporary tappings suitable for the above-mentioned transformers. A recent example of this class of tapping for a 15,000-volt line is illustrated in an article by the author which appeared in the Electrical Review of November 8th, page 805.

In connection with a large rural electrification scheme with which the author is associated, he came to the conclusion, bearing in mind British regulations and prejudices, that 6,600 volts might advisably be adopted as the intermediate voltage, more especially as there was so much practical experience

to justify and support that selection. But, upon taking the matter up with various manufacturers, there seemed to be little hope of obtaining British-made material at a reasonable price, since makers had to be prepared to supply the requirements of various undertakings over a range of voltages, resulting in the orders for any one voltage not being sufficient to justify mass production.

As a result of the author approaching the British Electrical Standards Association, its Electrical Industry Committee met on October 1st, 1929, and considered whether the list of standard voltages in B.S. Specification No. 77, Clause 5, could not be reduced in numbers for use in this country, and also whether it could make a definite recommendation for an intermediate voltage. The Committee did not feel that 6,600 volts was sufficiently high to be established as a standard, as it was quite convinced that satisfactory air-break control gear could be obtained for 11,000 volts, and it referred the matter to the Technical Committee on Voltages. Since then the writer has been informally informed that the British Electrical Standards Association has definitely decided, with the approval of the Electricity Commission, to recommend 11,000 volts, as both it and the Commissioners are satisfied that it is no longer necessary to use oil switchgear for that voltage, with which the author concurs, though he had feared to make such a radical proposal himself in case the whole suggestion might get quashed.

That voltage can be used for both distributors and feeders, and villages can be linked up and lines extended without troubling about sections; it will also serve areas nearly three times as great as will 6,600 volts. The difference in cost of the overhead-line material and air-break switchgear, as compared with 3,300-and 6,600-volt gear, naturally varies for each item; for instance, in the case of hand-operated air-break switchgear and fuses, 6,600 volts is the lowest pressure for which they are now normally designed and the saving, as compared with 11,000-volt gear, would seldom exceed ten per cent.; in fact, in the majority of cases it would probably be less. Poles and many other item costs would be unaltered and the extra cost of insulators need not be great. Whatever voltage is employed, the material has to be of a certain minimum robustness, so that the difference in actual size of insulators does not make so much of a difference in total cost as might be expected. Further, if 11,000 volts is recognised as a standard, the price of switches, transformers, &c., would fall to an economic level, since they would be produced by mass-production methods. The opinions of manufacturers on 11,000-volt air-break switchgear are also optimistic. The insulators specified are in excess of practical requirements, though they accord with the British Engineering Standards Association's standards; hence the price is higher than is really necessary, in spite of which most of the large manufacturing firms are now supplying suitable air-break switchgear for 11,000 volts, and one firm already makes air-break switchgear for use on 33,000-volt transmission lines. 11,000-volt generators are now being used in connection with urban supply; hence the extension of supplies from urban to rural areas will be accordingly facilitated if this standard voltage is adopted for overhead-line work.

Discussion.

Mr. F. H. CLOUGH expressed himself in favour of adopting 11,000 volts. The question of insulators might be determined largely by bird clearances, but that should not add very much to the cost. Transformers might be a little more expensive, but that extra cost might be offset by standardisation.

Mr. W. P. GAUVAIN also supported the suggestion to standardise 11,000 volts. He had had considerable experience of rural electrification in New Zealand; when that work was started the main voltage decided upon was 110,000 volts and the others adopted were 33,000, 11,000, 6,600 and 3,000, but the conclusion was soon reached that 3,000 volts was not economic, and 11,000 volts had been adopted in conjunction with the 33,000-volt lines, not only for feeders, but also for distributors. It was a little more expensive than 6,600 volts or 3,000 volts, but the line had a much larger capacity. From the point of view of mechanical considerations care should be taken that 11,000-volt lines should not be smaller than 7/.064, which was a Government regulation in New Zealand. There had been breakages when smaller lines had been used. Switchgear for 11,000 volts apparatus could be produced cheaply, even in New Zealand where everything had to be imported, and therefore it should be cheaper in this country. In New Zealand a very satisfactory 11,000-volt single-throw switch was produced for between £11 and £13, including the operating gear, which was bolted on to the side of the pole 7 ft. or 8 ft. above the ground. There was not a great deal of difference between the costs of 11,000-volt and 3,000-volt transformers. He did not agree with Mr. Matthews that failures of 3,300-volt lines would be less than of 6,600- or 11,000-volt lines, or that bird trouble would be less serious. Indeed, he was inclined to think that bird trouble would be more serious at the lower voltage, because insulator spacing was closer.

Mr. A. L. STANTON said that usually when a 6,600-volt line was erected, it was arranged to take 11,000 volts ultimately, and therefore he agreed that 11,000 volts should be adopted as the standard for the purpose mentioned. Electricity supply in this country had been too much dry nursed hitherto. They seemed to be afraid of voltage, but the fact was that experience of high voltage in other countries entirely contradicted the suggestion that there were greater risks with it, yet the regulations in this country carried that implication. Modern switchgear and transformer design enabled one to strike a good compromise and adopt 11,000 volts, at any rate until they learned what development was going to be like in future.

Mr. RUDKIN explained that in Switzerland they started with 3,000 volts, and had gone up to 10,000 volts after having tried 6,000 volts. In some cases 15,000 volts had been adopted, but generally 10,000 volts was the standard for rural distribution work, and it had enabled manufacturers to standardise their designs and reduce the cost of apparatus. To adopt any other voltage would be equivalent to going back 20 years. The cost of the line was not serious; it was only a matter of the cost of the insulators, and it must be remembered that the high-voltage line had a greater capacity.

Mr. TRENCHAM said that without necessarily suggesting that 11,000 volts would be an incorrect one to adopt for rural electrification—certainly the trend of opinion was in favour of it—he would like to draw attention to another aspect of the matter. It seemed to him that the correct voltage to adopt for any particular area must be a function of the density of the population, so to speak, to give a sufficient number of feeding points at 33,000 volts and sufficiently close spacing of the feeding points. The 6,600-volt switchgear made in this country was virtually designed for 11,000 volts, because it had not been found economic to standardise two lines of apparatus so close together. Whether that condition applied to overhead work in rural areas was a matter that might profitably be investigated. In a dense area where the distribution lines were close together there was the possibility of fairly severe faults occurring. In other words, if it were possible to lay out rural lines so that feeders were inherently limited as to their short-circuit capacity, that would enable apparatus of a light character to be used, so that the capital cost could be reduced. Voltage standardisation could only be regarded as a first step, and it should be followed by a consideration of the short-circuit conditions, so that the cheapest possible type of apparatus could be used. In that way it might be possible to produce a switch of the "ironmonger" type which could be fixed quickly and safely.

Mr. EDWARDS, who supported the suggestion that 11,000 volts should be standardised, thought the great tragedy of electrical matters was the fact that the general public was not better informed. The public became nervous when it heard about high voltages, and it would be an advantage if there were some organisation which could counteract the propaganda that was going on against the development of electricity.

Mr. THEODORE STEVENS (the president) did not know whether the objection was to high-voltage lines near towns. Personally he did not see why such lines could not be taken away from those parts where they were considered offensive, if they were offensive to the public. On the one hand, expert evidence had been given in the House of Lords by Mr. C. H. Merz and Major Richardson, supported by Sir John Snell, that the water power of Scotland should be developed and that it would be possible to transmit 50,000 kW a distance of 50 miles at a cost of 0.4d. per kWh. On the other hand, Mr. Fladgate had said he was absolutely stumped when trying to transmit 10 miles, whilst Sir Harry Renwick represented a company which transmitted from London to Rochester and was able to pay a dividend. There was something wrong somewhere, but, if transmission could be carried out so cheaply in Scotland, why should not the lines be lengthened a little in the London area, and the sulphur carried to where it would not affect London and so meet the requirements of those who took an interest in amenities?

Mr. E. W. DICKINSON (Rural Electrification Officer, Electricity Commission) expressing his personal opinion, was very pleased that Mr. Matthews had come to the conclusion that 11,000 volts was a good standard to adopt, although there might be instances in which for some isolated cases some other pressure might be economical. Areas in which 6,600 volts had been adopted, but where it was wished that 11,000 volts had been made use of in the first instance, were Northampton and Chester. The County of London Co. had adopted 11,000 volts for its Essex area. The Bedford scheme was a rather special one, and with a view to demonstrating the feasibility of electrifying a large area intensively and quickly, Mr. Phillips, the engineer, had in the first place adopted 6,600 volts, which was the generator voltage, but he had since decided to transform up to 11,000 volts. The reason why 3,300 and 6,600 volts had been adopted in certain cases was that they were the generator pressures; moreover, rural electrification in the past had been carried out sporadically without any regard to a general scheme. Whilst 11,000-volt transformers cost a little more in the smaller sizes, there was not much difference in the larger sizes, and he believed there was very little difference in the cost of switchgear for the higher voltage.

Mr. ROWLAND confirmed the suggestion that there was little difference in the cost of 11,000-volt switchgear as compared with 6,600-volt gear. The increased cost of the higher voltage would, to a large extent, be due to the insulators, but in the case of expensive components (such as switchgear) the extra cost of insulators was not an important item.

Mr. NAPIER PRENTICE, who also supported the standardisation of 11,000 volts, said he had put up some 3,000-volt work years ago, and soon wished it had been for 11,000 volts. The

reason why he adopted 3,000 volts was that it was the generator voltage of the nearest large town; extensions of the work were carried out at 11,000 volts.

Mr. G. W. MOLLE said his experience in South Lincolnshire also supported the standardisation of 11,000 volts. In order to get over the difficulty of the losses of the early years in that scheme, he had the transformers arranged for 6,600-volt tapping, but subsequently the voltage would be increased to 11,000 V. The reports of the National Electric Light Association of America on the use of various pressures seemed to show that the higher the voltage the fewer the number of accidents. In India where he had 3,300-volt and also 11,000-volt lines, there were comparatively few interruptions of the higher voltage installations, but considerable trouble was caused on the 3,300-volt lines by crows. In the case of bulk supplies, the generating authorities insisted upon oil switches being put on rural transformers, which experience showed to be quite unnecessary. They were afraid that the rural lines would cause trouble in the urban areas, but as a matter of fact all the trouble that did occur actually originated in the urban area. Thus oil switches could be omitted. The cost of switchgear could be reduced if they had not to apply such high test pressures after erection; moreover, applying a high test pressure to material as soon as it was completed weakened the insulation and laid up the possibility of future trouble.

Mr. LEACH said that although it might be true that in some cases 6,600-volt switchgear cost the same as 11,000-volt gear, that fact did not apply universally, because some firms definitely made 11,000-volt, 6,000-volt, and 3,000-volt switchgear. Up to three or four years ago there was quite a fair number of inquiries for 6,000-volt line equipment, but the majority was now for 11,000-volt gear. There were also on the market well-tried designs of air-break switchgear, which was a quite reasonably economical proposition, although he could visualise places where oil switches might be an advantage. Moreover, many oil switches were stood on the ground, so that a fault was not possible between the transformer and the oil switch; that arrangement had many advantages and was not expensive for 3,000 and 11,000 volts. Oil switches could be fitted with some form of time lag that took care of the kicks, so that small surges for short periods would not trip the switches.

Mr. R. BORLASE MATTHEWS said there had been such unanimity of opinion in favour of 11,000 volts that there was very little to reply to. The whole object of the paper was to advocate as high a voltage as possible that could be handled by as cheap apparatus as possible. Only by the use of the air-break switch in some form or other could the isolated consumer or villages between larger towns be dealt with. The whole difficulty was to keep down capital cost; it was a serious difficulty in this country and would have to be met. It was partly countered by the advantages of 11,000 volts. Wider spacing would solve the bird problem.

The Public Works Exhibition.

A Brief Review of Some of the Congress Papers and Exhibits of Electrical Interest.

THE biennial Public Works, Roads, and Transport Exhibition and Congress is promoted in the interest of local government, the display being selected to portray the latest developments in the engineering and other trades that cater for the needs of county, urban, and municipal authorities.

This year's show was the fifth of the series and was housed as usual at the Royal Agricultural Hall, Islington, London (November 18th to 23rd). The Congress Committee included representatives of the Municipal Tramways and Transport Association and of the Incorporated Municipal Electrical Association. The papers presented included those briefly reviewed below:—

Electricity and Roads (*Summary*).

By W. J. JONES, M.Sc., A.M.I.E.E. (E.L.M.A.)

Street lighting, particularly in so far as it contributes to the improvement of public safety and convenience, is a public service which touches every phase of our activities. Good street lighting is automatically associated with well conducted local government, and one cannot help regretting the many opportunities that are lost, since insufficient attention is given to the lighting of important areas. On the Continent and in the United States many bridges are lighted in a manner which enriches the design and accords with their importance. Why not luminous parapets and turrets?

At the last meeting of this Congress it was proposed that a Public Lighting Department should be set up for London to ensure the more economic operation of street lighting in the metropolis, the department to be under the control of an *ad hoc* committee. It was suggested as an urgent necessity on account of the numerous anomalies which existed under the present arrangements, which are in the hands of some 35 different bodies. Unfortunately, the parochial outlook still persists, the number of anomalies multiply, and the general patchiness of the street lighting in London which results continues. The lighting in the neighbourhood of terminal railway stations is as bad as ever; it is just nobody's job to be interested in the subject. Since this Congress last met, the city of Berlin, Germany, which was similarly divided into compartments, has effected co-ordination and already marked improvement is noticeable in the character and quality of its street lighting.

Another important phase that necessitates co-ordination is the lighting of arterial and by-pass roads. The utility of modern highways is frequently limited by inadequate lighting. Whose business is it to light new roads? Undoubtedly, so far as county roads are concerned, the County Council should be the lighting authority, while the subject of lighting those main roads should receive at least equal consideration at the hands of the Road Fund as the construction and maintenance of the roads themselves. In addition to city, urban district, and county council responsibilities, there are directions in which some national co-ordinating force would be advantageous. It should in any case be possible for the responsible authorities to refer the question to a Minister of State.

The minimum mounting height of 13 ft. of the British Standard Specification has resulted in many street installations being changed, and the increased mounting height has invariably brought about considerable improvement in the general quality of the lighting. Further improvement has been effected by the replacement of clear lamps with "Pearl" or "Opal" lamps. The "Pearl" inside frosted lamp, contrary to the expectations of many, gives a diffused light without appreciable loss in output; indeed, the efficiency is so high that the British Engineering Standards Committee has recently decided to include "Pearl" lamps, as regards luminous efficiency, life, &c., under the same rigorous specification used for clear lamps, while recent improvements in the manufacture of electric lamps have brought about marked improvements in luminous output.

No less than sixty-six supply undertakings in the country are supplying over 98 million kWh per annum for public lighting, representing over 211,000 public lamps, some 33½ per cent. of the total street lighting in the country. In the main thoroughfares of the larger towns, and even in the side streets, it already becomes possible to drive motor cars without headlamps, and there are not a few streets in the centre of London and provincial cities where vehicles might safely pass without any lamps upon them at all. That is at least one of the aims which should be kept in view for street lighting if "safety for all" is to be achieved.

Those of us who have been able to study traffic control by lighted signals in America and on the Continent have been convinced of its success as a means of making streets safer and speeding up traffic. The Royal Commission on Transport recommends the use of automatic light signals for traffic control and that uniformity throughout the country should be secured by the erection of the signals under the supervision of the Ministry of Transport, which has issued a memorandum laying down recommendations for the installation of signals. Traffic signs require very much more complete co-ordination than is at present provided. In some areas no attempt is made to light signs, while in others they are incorporated as part of the street lighting equipment. This last procedure cannot be too strongly deprecated, since it invariably results in reducing the effectiveness of the street lighting system and seldom performs satisfactory service as a traffic sign. The standardisation of traffic signs received considerable attention at a meeting of representatives of European countries at Geneva, and a code has been prepared which coincides almost completely with the recommendations of the Ministry of Transport. Great Britain took an active part in the preparation of the code, and some progress has since been made in changing signs to conform to this international agreement.

Town Planning.

Mr. B. PRICE DAVIES (city engineer and surveyor, Bangor), in a paper on the arrangement and economics of a town plan,

claims that, as compared with indiscriminate planning, at least 25 per cent. can be saved in road length. That is a modest figure and when resolved into money value it indicates that a considerable saving can be made in the amount of cable required for electric light and power and telephone road and house services.

Miss J. F. Abram's paper deals with the inter-relation of the public services and town planning. She points out that the town planning powers of to-day, though not sufficient as they stand to ensure a thoroughly well-organised use of modern services, are capable of materially assisting in the formulation of a pre-conceived inter-related scheme of utilisation, not only of public services, but also of the land.

Generally, supplies of fuel for lighting and power have an influence on development similar to that of water supply, but in a modified degree, and it will largely increase when the wide-spread electricity schemes already in hand have created an extended series of sub-stations which will supply areas at present comparatively remote. Beyond a point it is more practical and economical to found new sources of supply than to extend existing service mains limitlessly. This very fact, if allowed to govern the distribution of undertakings, should create a strong movement towards decentralization and completely detached, though inter-related, communities, expressing the principles that, from the town planning point of view, are agreed to be favourable and ultimately most beneficial to the community.

It is questionable whether the effect of power lines, if properly dealt with, will be more detrimental to the visual effect of the countryside than the telegraph poles and wires many of us have acquired a secret liking for. As there is no option but to accept this method of distribution, if there are to be efficient supplies, all that remains to be done is to secure that the lines shall as far as possible be subservient to the landscape, and it is for local authorities to see that they are in as strong a position as possible with regard to the preservation of amenities.

Efficient street lighting constitutes one of the most important reasons why housing development should not be contiguous with main highways. The needs of road vehicles and residential property are in this respect entirely opposite: on routes through country areas no difficulty arises, the traffic being adequately served by its own head-lights, but in built-up areas where traffic of all kinds is concentrated it is unsound to make use of these, and vehicles are instantly dependent on street lighting. Existing methods of street lighting in town centres are unsuitable in principle and character, mainly from the point of view of swift moving traffic, as the isolated intermittent points of light provided create confused visibility. Possibly the best solution of the problem of providing generous dazzle-free illumination in the streets, at least in the business portions of urban areas, would be to revert to a system of private supply, whereby all buildings fronting on the street must be flood-lighted. This should cause no detriment to individual interests, as the main aim of commercial enterprises to-day is to force attention. Such methods would not apply in residential districts, as the brilliant illumination created would destroy any sense of restfulness essential to appropriate housing areas, but even there some system of more diffused lighting would be an advantage.

This problem rather emphasises the value of the power to zone land for specific purposes, as by no other procedure than town planning is there any complete possibility of properly segregating types of buildings.

The Exhibits.

Horstmann Gear Co., Ltd., a range of "Newbridge" electric time switches for street lighting, including the neat "T"-type and electrically-wound models.

Blackstone & Co., Ltd., oil-engined electric lighting set, with D.P. battery and switchboard.

Ransomes & Rapier, Ltd., petrol-electric mobile crane for material handling; made in four sizes of from one to six tons lifting capacity.

Messrs. Spiros, portable electrically-driven air compressors.

Weston, Shipley & Weston, Ltd., electric tri-pod lamps for safety trench and excavation lighting.

Hub Ironworks Co., Ltd., street refuge and traffic signal lamps, posts, &c.

Allen-Liversidge, Ltd., electric welding equipment.

Reavell & Co., Ltd., electrically-driven air compressors, including a model specially suitable for operating a concrete breaker for tramway track repairs.

Solanite, Ltd., road direction, traffic warning, and public service signs.

Tungstone Accumulator Co., Ltd., storage batteries.

International Combustion, Ltd., a "Hummer" screen, which will operate wet or dry and requires no lubrication; it is said to be used by 20 large English collieries, the intensive vibration of the screen being maintained electro-magnetically.

Carl Zeiss (London), Ltd., electric reflector lamps for street lighting and public building illumination; vehicle head lamps, and traffic direction indicators and "winkers."

Electricars, Ltd., a 2-ton, low-loading, refuse collecting vehicle which is capable of being driven approximately 25 miles per battery charge, the average speed being 12 m.p.h.; a 1-ton chassis for local delivery service was also on view.

Air Pumps, Ltd., garage pumps and air compressors.

Franco-British Electrical Co., Ltd., reflective night signs.

J. Halden & Co., Ltd., drawing office photo printing machine and duplex radial copying frame.

Electrically-operated office equipment was shown by Addressograph, Ltd., and the Hayward Co.

Legal.

An Electrical Dealer Fined.

The *Daily Telegraph* reports that at the Mansion House on November 21st Harold Leslie Dixon, trading as "Electradix Radios," Upper Thames Street, E.C.4, was fined £5, with £2 2s. costs, for issuing a trade catalogue bearing his business name, but which did not contain his Christian name or initials, contrary to the provisions of the Registration of Business Names Act.

Mr. W. S. Bourne, representing the Board of Trade, said that the catalogue advertised a "Government disposal sale," which almost made it appear as though a sale by a Government department was referred to.

The defendant, who said that he was a freeman of the City and a member of the Institution of Electrical Engineers, stated that it was a common trade practice for manufacturers to issue catalogues which did not bear their names, so that a retailer need not disclose the source of supply. A circular letter bearing his name accompanied each copy of the catalogue. He undertook to gum a slip bearing his name to each circular issued in future.

Valve-holder Patent Dispute.

Judgment was given in the Chancery Division last week in the action in which the Benjamin Electric, Ltd., and the Igranic Electric Co., Ltd., sought an injunction to restrain Messrs. Garnett, Whiteley & Co., Ltd., Liverpool, from infringing the plaintiffs' patents for improvements in thermionic valve holders.

Mr. Justice Clauson said the action concerned two patents belonging to the plaintiffs—the Benjamin and the Burndept—and they related to holders, the object of which was to minimise the effect of shock or vibration upon thermionic valves. It was obvious that they had been infringed and the questions for the Court were whether prior publication and prior user amounted to anticipation and whether the plaintiffs' inventions contained subject matter for a patent. In both cases the valve holders were carried on springs, the springs serving to carry the holder and to conduct the current to the valve.

Describing the various alleged anticipating inventions and prior user, his Lordship said there was some evidence that in December, 1923, the Sterling Co. made and published a form of holder, but it was not a true anticipation. It was said that the plaintiffs' device was merely a combination of several old features, but it appeared to him that the combination was a new and useful article. He held that both the patents were valid and had been infringed, and therefore there would be judgment for the plaintiffs.

A stay of execution was granted with a view to an appeal.

Stocker v. G. Thomas (Dover), Ltd.

In the High Court, on November 19th, an action was brought against Messrs. George Thomas (Dover), Ltd., Dover, by Messrs. A. H. & H. G. Stocker, proprietors of Kearsney Court, nr. Dover. The plaintiffs alleged that in 1927 they employed the defendants to overhaul the electric lighting installation for which they paid £156, but afterwards found that the work had been done so badly that they had to have it re-done. They accordingly claimed £151.

The defendants denied negligence, and pleaded that the work was done under the personal supervision of the plaintiffs' foreman of works and approved by him.

Mr. Carthew, for the plaintiffs, detailed some of the defects complained of, and said that the joints in the cables were made simply by twisting the wires and re-insulating them, but without soldering. The cables were cramped and tightly pressed together without sufficient insulation. The extensions were contrary to regulations, and wires had been passed down through ceilings without any protection. The defendants did not do the work themselves but sub-contracted with a Mr. Mason, of Dover. It was not true that Brown, the plaintiffs' foreman of works, gave approval of the work as he was not authorised to do so. It was after complaint had been made by the Dover electrical engineer that the plaintiffs employed an expert to examine the work and then found that it had been badly done.

Mr. Brown, giving evidence, admitted in cross examination, that he might have told the defendants that he was very pleased with the work.

Mr. James Douglas Allen said that the work was exceptionally bad and material used was unsuitable for the purpose. Mr. Clery, of Messrs. Drake & Gorham, who inspected the work done by the defendants, said the re-wiring should have been

done on the looping-in system. The work as done by his firm would cost £345. Mr. David Connors, foreman to Messrs. Drake & Gorham, said that the junctions in the wiring were done by defendants in a way that no conscientious workmen would ever do them. A good deal of the work was left in a dangerous condition.

Mr. Craig Henderson, for the defendants, said that they agreed that the job ought to have been done on the looping-in system, but they were compelled to do it on exactly the same system as they found it, as time did not permit of adopting any other. They did exactly what they were employed to do and were not allowed to adopt the looping-in system. The joints were done exactly as the old ones had been done. It was impossible in repairing an old system to work in accordance with modern regulations, and it was significant that nothing ever went wrong with the work.

Mr. E. W. Hansell, K.C., Official Referee, giving judgment, said that though it might have been better to adopt the looping-in system and to solder instead of adopting the tie joint, there was no obligation on the defendants under the contract to change the system which they found existing, especially as no danger resulted. The plaintiffs had failed to prove that what the defendants did was not enough to make the work sufficient and safe, and therefore there would be judgment for defendants with costs.

Oxford Corporation v. Oxford Electric Co., Ltd.

On the application of Mr. Tyldesley Jones, K.C., on behalf of the plaintiffs, Mr. Justice Bennett, in the Chancery Division, on November 22nd, fixed December 11th, subject to anything part heard, for the hearing of this action. Counsel said that the action related to the construction of an Act of Parliament under which the Corporation had served notice on the company requiring it to sell to the Corporation the electricity undertaking. Evidence would probably not be called on the claim, but there would be some on a counter-claim.

Compensation Claim Follows Fatal Shock.

Judgement was given by his Honour Judge Beazley in the Hull County Court on November 18th, in the case reported in our last issue in which Thomas Drust, Hessle, claimed £150 from Messrs Watshams, Ltd., as compensation for the death of his son, Sidney Drust, as the result of an electric shock while in the defendants' employment.

His Honour adopted the defendants' view that the deceased had exceeded his duties and had no right to climb a pole at all. Thus he was bound to find that the accident did not arise out of, or in the course of, Drust's employment and the application would be dismissed with costs.

Supply Company's Action Fails.

In the Edinburgh Sheriff Court recently the Lothians Electric Power Co. sued Major A. S. Steven, Longniddry, for £13 18s. 6d. alleged to be due for electricity supplied.

The evidence showed that owing to the defendant's house being frequently closed during his absence, the company had been unable to read the meter for several quarters. Nevertheless, it had sent in quarterly accounts, based on the minimum charge, which had been paid. These amounted in all to £4 12s. 6d. The amount now claimed represented the cost of energy supplied during the whole of that period. Defendant maintained that he was being charged twice over, and offered to pay the difference, £9 3s.

Sheriff Orr said that the defendant had established his case. The company was not entitled to more than £9 3s. and as Major Steven had offered that amount the claim must be dismissed and the defendant's expenses paid.

False Pretences Charge.

At Darwen, on November 23rd, Robert Grimshaw, Blackburn, was charged with obtaining electrical goods by false pretences from Moses Hunt & Son, electricians, Duckworth Street, Darwen. It was alleged that Grimshaw went to the shop and obtained a number of electric lamps, saying that he was doing a job at a shop in Railway Road, which had to be completed by Friday. He failed to pay the account by the day he promised to do so.

Grimshaw, pleading not guilty, asked for an opportunity to obtain legal aid. A remand was granted.

Electrical Trades Benevolent Institution.

The annual festival dinner of the Electrical Trades Benevolent Institution was held at the Savoy Hotel on Tuesday last, under the festival presidency of Mr. Howard Marryat, M.I.E.E., M.I.Mech.E. The dinner was this year followed by a dance, the whole function proving as enjoyable as it was efficient for its benevolent purpose. We propose returning to the subject at great length next week, but meanwhile we may state that donations during the year (including Tuesday's collection) amounted to the record figure of over £9,000.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

Two-Part Tariff Prepayment Meters.

Replying to Mr. H. Horwood in your issue of November 22nd we would say that every meter engineer "worth his salt" is fully aware that the object of any special tariff is to increase the amount of electricity sold, and also the net revenue of the undertaking.

It can be readily appreciated that a consumption of 1 kWh in 4½ days would hardly be considered satisfactory, and any engineer who was satisfied to consider it so would deserve to whistle for the balance of the fixed charge due.

Taking as our example the same rate as mentioned by Mr. Horwood, we would consider that when only one 1 kW radiator is included in the installation, a daily consumption of 4 units would be fair average; this would clear the fixed charge of 15s. in 30 days, and thus leave the remaining two months clear on the 1½d. rate, and so encourage a more extensive use of their valuable servant, electricity.

Discerning engineers will see, therefore, that the use of this meter, which enables the consumer to obtain current supply on the insertion of the first coin, and does not necessitate the finding of a lump sum before he can commence consuming current, not only solves the problem of popular current supply to consumers of small means and weekly budget, but also constitutes an indicator of the efficacy of their publicity and showroom methods. Collectors' records could be scanned, and wherever the fixed charge is not cleared the consumer should be educated to the more extensive use of current or, if this is not possible, be placed upon a plain prepayment flat rate.

On occasion, the fixed charge may not be quite cleared during a summer quarter. This can be easily adjusted by adding the balance when settling the fixed charge amount to be collected in the subsequent quarter.

Certain go-ahead supply authorities have got over this possible difficulty by doubling the fixed-charge payment for the two winter quarters, and not making any fixed charge for the summer quarters. This has the double effect of ensuring the clearing of the fixed charge during the heavy consumption period, and by its psychological effect increases summer-time consumption, for the consumers do not watch their current consumption so closely when they are getting it all at the lowest rate.

In cases in which the engineer does not consider the 50/50 ration of collection suitable, the meter can be supplied with a ratio of 75/25, thus crediting fixed charge with three-quarters of each coin inserted, and other reasonable ratios can also be supplied.

Possible difficulties which might arise have been thoroughly gone into by many eminent station engineers who have applied the tariff, and the general consensus of opinion has been that "Rex" fixed charge prepayment meter is just the piece of apparatus for the job, and does all that is claimed for it.

Thompson & Co.

London, E.C.3, *November 25th*, 1929.

I am interested in Mr. H. Horwood's letter in your issue of November 22nd and agree with him that the "Rex" meter idea, while very good at first sight, has the serious defect that the worst type of consumer can get a limited amount of electricity at only twice the low unit rate. I am afraid Mr. Horwood has not realised that one type of A.E.G. meter is not really suitable, because the consumer of the type which uses a slot meter will jib at putting in 15s. at once just after the collector has called, and the collector will often find nothing in the meter, not even the meter rent, but he will find an oil lamp in use. The other type of A.E.G. meter is theoretically perfect, but requires a clock or its equivalent, and for that reason is open to objection on the grounds of cost or unreliability and/or inaccuracy, also of illegality under the British Electricity Acts.

W. Fennell.

Northwich, *November 23rd*, 1929.

Rationalisation and Labour.

I was interested in reading in your issue of the 15th inst. the letter from your correspondent "Anti-Rationalisation." He expresses some interest as to the fate of the staffs of the different companies which might be brought together to form the contemplated monopolies. I think he need not be in any doubt as to what would happen to any labour—whether practical or staff—which would be dispensed with. I should think its retention would be a "dubious advantage." What ground is there for suggesting that the withdrawal of these few is ever likely to lead to our re-capturing our position in the world's trade? I have read that monopolists here have entered into agreements with foreign monopolists, and, if "German and American industries with their many trusts and combines tend to the exclusion of foreign imports," what is the reason of

combining with them? If these trusts and combines enable them to exclude foreign imports what have they to gain by making any arrangements with our people? Are they to share other markets and on what consideration? How would the creation of an international monopoly help our workpeople?

I do not wish to give a bad advertisement to our big industrial companies, but I think it would be interesting to know the amount of capital lost by small firms "who have found it increasingly difficult to carry on" since the date when we lost our position in the world's trade (whenever that was), and the amount of capital lost by the big companies. The shareholders in some of these latter are certainly not smiling at their fate. This brings me to your correspondent's remarks on the railways. I do not know a sufficient number of the staffs rendered redundant by the amalgamations (round which so much nonsense about efficiency and economy was written at the time) to ascertain what has been the result generally to them, but I do know, as a shareholder in several companies, that I am worse off than I was before the amalgamations. I am thankful to the road passenger services for waking up the directors of the railway companies to a sense of their position and for any future advantage which may result therefrom.

Your correspondent seems to think that the standard of living of the workpeople in other countries is lower than that of the workers here, but this I think is open to question. The Archbishop of Canterbury, preaching last Sunday, said he had just heard of a house with sixteen rooms containing seventy-two persons—more than four living in each room. This appears to me to want a lot of beating. I certainly think the directors of the big industrial firms abroad have a lower standard of living than ours, and possibly if some of ours had their remuneration cut down it would help the concerns with which they are connected, and without bringing the gentlemen anywhere near starvation. Of course, if one were to suggest this at a shareholders' meeting, the spokesman of the directors, with difficulty making himself audible through his tears, would point out that he was really paid very little for his services, and there would be shareholders (some of whom would be glad to have the annual fees received by the director from only one of his companies) who would cheer that announcement, which would prove again how correct was the judgment of the Chelsea sage on the inhabitants of this planet.

I think Mr. Parsons is quite right in thinking that the worker will probably think along political lines: it seems to me that he has already done so, and the work of the present Government will make him think harder than ever. Even the staff worker dispensed with by "Rationalisation" or "Monopoly"—whatever it may be called—need not despair. The Labour Government might put him down for a pension if he adopted the slogan "no suspension without pension."

I agree with your correspondent that "Rationalisation" can have only one result—that of increasing prices—and in consequence of reducing the purchasing power of wages.

Anti-too.

November 19th, 1929.

Standardisation of Size of Advertisement Pages.

The variety of page sizes in British trade and technical journals is the cause of much waste of money by advertising through the multiplication of designs and blocks. An advertiser using the same advertisement in three journals having page sizes of, say, (1) 8in. by 5½ in., (2) 9 in. by 6¼ in., and (3) 11 in. by 7½ in., must necessarily have three sets of blocks, and in the case of journal No. (3), whose page differs in proportions from those of Nos. (1) and (2), he must also have a new layout. It might be thought that the unnecessary expenditure under this heading is small, but in actual fact it is a serious item for all advertisers, and in the case of one engineering firm in the North of England is estimated to represent no less than 15 per cent. of the money spent on designs and blocks.

As in the design and production of commodities, so also in the design and production of advertisements, it is essential to eliminate waste and make for greater efficiency and economy by the adoption of standards. The Engineering Section of the Incorporated Society of British Advertisers, Ltd., has therefore initiated a movement towards the standardisation of page size in British trade and technical journals, and this letter sets forth the proposals, so that the opinions of other advertisers than those who are members of the Society may be obtained.

Since any money which is wasted by the advertiser on unnecessary designs and blocks cannot be spent on the purchase of advertising space, such money is lost to the publisher, and it is quite as much to his interest as to that of the advertiser to assist in preventing this waste. The Incorporated Society of British Advertisers, Ltd., has therefore invited the co-operation of the publishers in considering the problem and the practical steps to be taken in adopting standards. The Society desires to thank a large number of publishers for their practical assistance in the formation of a Joint Committee representing the Incorporated Society of British Advertisers, Ltd., the Periodical, Trade Press and Weekly Newspaper Proprietors' Association, Ltd., and independent publishers. This committee now proposes the following:—

"That a standard type space size of 10 in. by 7 in. be adopted for advertisement pages by trade and technical journals in Great Britain, and that if a larger or smaller page be considered to be absolutely necessary this should be in the same ratio—and either 11¼ in. by 8 in. or 9 in. by 6½ in."

The proposals affect only the area occupied by the advertisement, and do not affect the gross page size.

The standards have been proposed for the following reasons:—

(1) 10 in. by 7 in. is already the printed page size of a large number of British trade and technical journals, and has been adopted as standard in Canada and the United States. It further approximates so closely to the page size of many other British trade and technical journals that the change to the standard can be made without undue inconvenience on the part of the publisher.

(2) While it is desirable to have one standard only, this is not practicable at present, and it is therefore proposed that two other sizes should be considered. These, however, are in the same proportion as the 10 in. by 7 in. page, so that the same drawings and designs may be used without alteration.

Although publisher and advertiser will both share the ultimate benefit of standardisation, we realise that the change from over 135 page sizes to 3 for British trade and technical journals will involve a certain amount of expense for the publishers of those journals whose pages do not at present correspond with the standards proposed. It is only reasonable, therefore, that we, as advertisers, should recognise this fact and should be prepared to meet the convenience of publishers in making the change. We propose, therefore, that any change of size should be made at a time convenient to the publisher of any journal concerned, preferably at the end of a volume, and we also propose that when the page size of a journal is slightly reduced, no demand is to be made for a reduction in rate, although the advertiser will lose a small percentage of space.

Many publishers are keenly interested in the proposed standardisation, and are anxious to put our proposals into effect. Before they take such an important step, however, they wish to ascertain the views of their advertisers as a whole. This is a reasonable standpoint to adopt and we invite you therefore to write, giving your opinions on the proposals regarding standardisation made by the Joint Committee, to the Secretary, Incorporated Society of British Advertisers, Ltd., Aldwych House, Aldwych, W.C.2, with a copy of the letter to the Editors of this journal.

Thomas Bell,
Chairman, I.S.B.A.

J. Taffs,
Chairman, ENGINEERING SECTION, I.S.B.A.

A. W. Swan,
Hon. Secretary, ENGINEERING SECTION I.S.B.A.

Alfred H. Angus,
General Secretary, I.S.B.A.

Aldwych House, Aldwych, W.C.2, *November 22nd*, 1929.

[We invite advertisers and readers to communicate their views with reference to this appeal.—EDS. ELEC. REV.]

The Point Five Domestic Rate.

The resolution of the Point Fives on July 13th, 1912, was not original, as I obtained the permission of the Ayr Electricity Committee to use my two-part tariff, based on the costs analysis of (*a*) fuel and (*b*) all other charges, in 1895. It clashed with the maximum-demand system, which the consulting engineer, the late Mr. Robert Hammond, preferred, and after much strong protest on my part was distorted into a discount system, which entirely destroyed the beauty and accuracy of the original. The last paragraph of the article is scarcely fair to those who adopt this tariff. The advantages of it are so obvious that I cannot think any supply engineer would adopt it without fairly realising what those advantages are. It certainly gives the greatest possible incentive to long-hour use because, the overhead charges being fully paid in proportion to the size of the connection, the whole of the usage is at fuel cost. In the original it was proposed to adjust the (*b*) charge quarterly, as the connections increased, and the fuel charge in accordance with the variations in price of coal. A common use of it would very soon reveal the most appropriate method of adjustment. My object in writing is to claim the credit due to me as the originator.

Ernest G. Pink.

Blackheath, S.E.3, *November 20th*, 1929.

Specially Designed Cooking Utensils.

The remarkable progress and efficiency that has been made in the construction of electric cookers is entirely due to the advent of the new totally enclosed boiling plates. These are not only damage proof and last much longer than the older visible elements, but, due to their enclosure, foods boiling over in no way affect the element. Why then, with these important improvements, is it that there are so many complaints that

cooking by electricity is much more expensive than gas? It is entirely due to the apathy on the part of both cooker manufacturers and engineers to examine the cause properly. The failures of boiling plates on the Continent is only 1 per cent., while in England it varies between 15 per cent. and 20 per cent., and, as the manufacturers of plates guarantee their articles from one to two years, the question is of great concern, both to the public and the guarantors. Engineers take no trouble to find the proper type of cooking utensil that should be used; they are afraid to speak the truth to clients and to point out that as the heat is derived by contact and the new boiling plates are machined flat, so must all cooking utensils also be machined flat. We are indebted to Mr. De Brunner of the "Margo" Company for much valuable material on the subject; he has spent considerable time in making tests, and these have been confirmed by the Revo Electric Co., Ltd., and many of the leading engineers, revealing the fact that light-weight spun cooking utensils quickly buckle and warp, increasing the current consumption considerably (see ELEC. REV., November 22nd, 1929, p. 897).

If electrical engineers continue to neglect this subject they will simply play into the hands of their competitors, the gas industry. It is extraordinary what a great amount of prejudice and difficulty we have to overcome in order to get engineers to examine our models and test the claims we make, and before we can establish the most simple principles. Such matters as condensation between the kettle bottom and plate are waved aside as of no importance, whereas they adversely effect efficiency. Sigg's electric utensils are so constructed that condensation is efficiently provided for so that these losses are controllled. On the Continent element kettles are practically unknown, mainly because of the costly maintenance departments that are necessary for their up-keep, none of which are necessary with gas stoves. The writer maintains that most electrical engineers' calculations are entirely upset by these costs, and many of our engineers already predict that as a kitchen utensil the element kettle is doomed. The writer is confident that the electric cooker is the most hygienic method in these days, where labour saving devices are in so much need. It is cleaner, more easily handled by housewives, and easier to understand, but it must be competitive against its older rival gas, and this can only be obtained provided the points raised are properly examined and the public correctly instructed.

S. Davis Nicholls, *Manager*, SIGG, LIMITED.

London, *November 18th*, 1929.

Power Consumers and Peak Loads.

You have recently published very frequent articles and letters in your "Correspondence" columns on the importance of load factor, and all of those publications have aimed at adapting the electricity supply of the country to the existing conditions, whereas it seems to me that it might be well worth approaching the matter from another point of view and adapting the conditions to electricity supply.

The peak loads which generating stations experience only occur during a brief period of the year and last only for a very short time, probably less than an hour. If power users could be persuaded, or even coerced by legislation, to shut down at 4 p.m. instead of at 5 p.m. from the middle of November to the end of December, I consider it would result in a saving of from 10 to 20 per cent. of the cost of generating electricity, and this saving could be handed on to the customer in the shape of lower prices.

The country accepted the Daylight Saving Bill because it was obviously for the greatest good of the greatest number, and I have no doubt that the suggested arrangement would be adopted after a time in a similar way. I do not refer, of course, to power in places of continuous manufacture, but to the consumers who at present shut down at 5 o'clock, after they have created a peak load at 4.45 p.m. by over-lapping the shop lighting load.

I should be interested to see through the medium of your columns the comments of your readers.

H. Wilson.

Ashford, Kent, *November 19th*, 1929.

Small Hydro-Electric Schemes.

With reference to the letter of "Interested" in the ELECTRICAL REVIEW of November 15th, I regret it has not been replied to before, but I have been away on some work in the south.

The following information may be of interest to your correspondent. First of all, an annual load factor of 20 per cent. for many hydro-electric plants is very low, and if you have the water, as one often has, you can load your plant practically up to full load day and night by using all spare energy for heating or cooking, including hot water systems, &c.

In the case under question the capital cost of the sets was high, due to the low fall available (about 4 ft.) and the relatively high cost of the foundation work, which was hindered a good deal by heavy floods. No battery is used with the sets, and a very satisfactory load factor is obtained by utilising current at night for water heating, and for radiators and refrigeration. The sets are able to run practically continuously at large gate openings because of the abundance and reliability of the water in the river, while floods, though fairly frequent during the winter, do not interfere with output by causing more than 20 per cent. reduction as a maximum for short periods only. With regard to the operating cost of the gas engine plant, this was not, of course, new.

M. I. Williams-Ellis.

North Wales, *November 16th*, 1929.

The All-Electric Home.

There is room for a little analysis with regard to Mr. F. J. Moffett's letter, so that we may find out the physiological reason for his expression of preference for a "gas coke" house.

In the first place, he admits its cost was £25 in 1928, and £20 already in 1929, with the worst part to come, against Professor Parker Smith's £43, in a house and with a family which may be larger than Mr. Moffett's. The difference of £18 per annum, or 7s. 6d. per week, would not in itself weigh very much with a man in his position, especially as his family is thereby condemned to the nasty grating job of shovelling coke; and he had to buy and probably has the burden of looking after that "small gas engine" and the poor overworked little generator. It is clear that he is really a lover of electricity—or he would use gas for lighting—or perhaps Mrs. Moffett, "whose opinion on this point is the only one which matters," drew the line just before she reached the item of gas lighting. No, he is a "gas and coker" because he has no public supply of electricity available! How do I know? If he had public mains, there would be no small gas engine and little dynamo. Apart from its cost, noise, and inconvenience, the palpably lower overall efficiency—coal to electricity—*via* the gasworks, gas leaks, the small engine, and the little and essentially inefficient dynamo, as compared with the local power station and mains, would sear his soul, and his expressed love of overall efficiency would bring him on the mains. Once on the main, his wife, "whose opinion," &c., would do the rest. He is, therefore, in the dual positions of the fox who said the grapes were sour and of the wolf who tried to persuade the other wolves to cut off their inefficient tails! Circumstances were against them, and they were very human. They and he have made the best of a bad job, and pretend they are better off without what they cannot have.

Sherlock Holmes.

November 23rd, 1929.

"So Near . . ."

The article in the ELECTRICAL REVIEW of November 8th, by "Ric," is very true. The hardest case of all is that in which the father dies before training is complete, for the delusion (it may be) is hugged that if the fees had been supplied, instead of toiled for, the attainment would have been equal to that of men who were level with him when the check came. Some keep on because they enjoy the effort and because they hate to agree with the "I told you so" brigade.

One thing which puzzles the type of man mentioned by "Ric" is that managers do not seem to see below the surface—they accept paper qualifications and do not give the man a trial.

This fault seems general to the British policy of promotion. A few days ago it was pointed out, as an exceptional case, that a Consul had become an Ambassador. To ordinary people these posts seem to belong to the same profession, yet apparently they are two parellel lines which never meet. Must there also be two lines in the electrical industry—day and shift engineers—which never meet?

Seventy-five per cent. of the posts filled in the last three years have been given to men who have been employed in mains departments, and the shift engineer is now completely forgotten; yet considering the physical strain of shift hours, managers should make it a rule that no man over 35 should be on this work. Although power houses are to be closed down under the grid scheme, I know of only one attempt to give shift men an opportunity of acquiring an insight into other work. As some men like shift hours, a register should be prepared, so that men who are qualified for any day time jobs can have them and their places can be taken by shift men.

Certain people are trying to create the impression that there are not men capable of high promotion. This is rubbish; the brains are there, but owing to some fad or fashion of the moment they refuse to look in the right direction.

Looker-on.

November 22nd, 1929.

Smoothing Circuits.

It is required to calculate the inductance and capacity values for smoothing circuits for use with direct or uni-directional currents. Not being able to find suitable formulæ in the text books, I should be glad to know if any of your readers could say what are the constants for this calculation, or whether it is a matter of trial and error.

J. W. Cooper.

London, N.15, *November 20th*, 1929.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Electricity in Essex.

On November 13th Colonel HOWARD-BURY asked the Minister of Transport whether he could give any information regarding the progress of the electricity scheme as it affected the county of Essex.

Mr. H. MORRISON said that with regard to the proposed construction by the Central Electricity Board of main transmission lines in Essex, contracts had been let for the lines from Brimsdown to Barking and from Barking to Rayleigh. The Board hoped that those lines would be in service by the winter of 1930/31.

Steel Telegraph Poles.

On November 19th, Mr. J. H. THOMAS, Lord Privy Seal, informed Mr. Fison that he was still considering, in consultation with the Post Office and other authorities, whether it was possible to use steel, steel and concrete, or concrete poles in substitution for wooden telegraph poles.

B.B.C. Expenditure.

On November 19th, Mr. H. B. LEES-SMITH, the Postmaster-General, informed Mr. N. Maclean that the B.B.C.'s total expenditure during 1928, including provision for depreciation, was £879,324 and its total income was £1,002,505, of which sum £871,764 was in respect of wireless licences.

L.N.E.R. Electrification.

On November 20th, Mr. EDE asked the Minister of Transport if he had drawn the attention of the London and North-Eastern Railway Co. to the possibility of electrifying the railway between Newcastle and South Shields; if so, had he received any reply, and what was its nature.

Mr. H. MORRISON said he had recently been in communication with the Railway Company with regard to this matter, and had been informed that the question of the electrification of the section of line concerned had been considered, and that in the company's view there were a number of other schemes for improvements to its system which should be given precedence of it.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1928.

12,245. "System of distant electric control by synchronised distributors." A. Blondel. April 27th, 1927. (289,443.)

13,029. "Television systems." J. Johnston. May 3rd, 1928. (Cognate application, 14,516/28.) (321,194.)

13,213. "Glow-discharge lamps and the like." J. L. Baird and Television, Ltd. May 4th, 1928. (321,196.)

15,912. "Remote-electric control systems." British Thomson-Houston Co., Ltd. May 31st, 1927. (291,384.)

16,330. "Day and night signs." H. H. Berry. March 5th, 1929. (320,979.)

18,493. "Electrical reproduction of gramophone and like sound records." P. D. Tyers. June 26th, 1928. (321,144.)

18,924. "Switchgear for operating systems of electric lighting in railway carriages and other vehicles." King's Patent Agency, Ltd. (W. B. Phillips). June 29th, 1928. (321,147.)

19,093. "Vacuum tube electric devices." M.O. Valve Co., Ltd., and B. S. Gossling. July 2nd, 1928. (321,197.)

19,175. "Thermionic valves and the like." Allgemeine Elektricitäts Ges. July 2nd, 1927. (293,323.)

21,143. "Sound-reproducing apparatus, and particularly talking motion-picture apparatus." W. E. Beatty (Bell Telephone Laboratories, Inc.). July 20th, 1928. (321,148.)

21,618. "Electromechanical apparatus, such as sound reproducers or transmitters, oscillographs, and the like," P. W. Willans. July 25th, 1928. (321,151.)

21,670. "Electrical point and lock detectors for railways." A. V. Tomlinson (McKenzie & Holland (Australia) Proprietary, Ltd.). July 26th, 1928. (321,156.)

21,992. "Metallic boxes or cases such as used for the mounting of electric switches or other electrical accessories." Simplex Conduits, Ltd., and H. F. McLoughlin. July 30th, 1928. (321,165.)

22,221. "Electric protective systems and apparatus for use therewith." D. Ripley. July 31st, 1928. (321,206.)

22,234. "Switch and other cover plates such as used in conjunction with flush-mounted and surface-mounted electrical accessories." J. A. Crabtree and B. G. Harrison. August 1st, 1928. (321,184.)

22,303. "Illuminating devices for operations." W. A. E. Crombie. August 1st, 1928. (321,208.)

22,442. "Ammeter." A.C. Spark Plug Co. August 19th, 1927. (295,714.)

22,458. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., G. A. Burns, and H. S. Deyes. August 2nd, 1928. (321,216.)

22,525. "Mercury-vapour rectifiers." Akt. Ges. Brown, Boveri et Cie. February 23rd, 1928. (306,520.)

22,551. "Light-sensitive apparatus. Westinghouse Brake and Saxby Signal Co., Ltd January 23rd, 1928. (304,644.)

22,552. "Light signals." Westinghouse Brake and Saxby Signal Co., Ltd. November 25th, 1927. (301,056.)

22,564. "Electric discharge devices for use as relays." Siemens-Schuckertwerke Akt Ges. August 17th, 1927. (295,685.)

22,611. "Jointing of multi-core electric cables." W. T. Henley's Telegraph Works Co., Ltd., A. W. C. McArthur, and H. C. Hoban. August 3rd, 1928. (321,223.)

22,646. "Devices for interrupting and for closing electric circuits employed in connection with internal-combustion motors and other electric circuits." P. E. J. Eggers. August 4th, 1928. (321,226.)

22,780. "Electrical maximum-demand indicating device." Siemens-Schuckertwerke Akt. Ges. August 11th, 1927. (295,389.)

22,934. "Thermionic valves." Allgemeine Elektricitäts Ges. August 9th, 1927. (295,330.)

23,211. "Electric protective arrangements." British Thomson-Houston Co., Ltd. August 11th, 1927. (295,402.)

23,298. "Distance or depth-finding systems or apparatus." Submarine Signal Co. April 17th, 1928. (309,901.)

23,521. "Terminal boxes for multi-core cables." International General Electric Co., Inc. August 15th, 1927. (295,640.)

23,633. "Sound-reproducing devices." British Thomson-Houston Co., Ltd., and L. B. Ault. August 16th, 1928. (321,246.)

23,644. "Means for operating wireless sets from supply mains or machine generators." Telefonaktiebolaget L. M. Ericsson. April 17th, 1928. (309,903.)

23,725. "Insulated cable joints." British Thomson-Houston Co., Ltd. August 18th, 1927. (295,724.)

24,711. "Slow-motion mechanism or fine-adjustment device for electrical tuning apparatus." L. E. Fillmore and L. W. Fillmore (trading as Jackson Bros.). August 28th, 1928. (321,259.)

25,144. "Portable electric lampholders." W. R. Millar. September 1st, 1928. (321,264.)

25,214. "Suspension insulators and strain insulators for electric conductors." Compagnie Générale d'Electro-Ceramique. September 3rd, 1927. (296,673.)

25,258. "Connecting devices for use in electric circuits." Callender's Cable and Construction Co., Ltd., and A. E. Wilson. September 3rd, 1928. (321,265.)

25,259. "Connecting devices for use in electric circuits." Callender's Cable and Construction Co, Ltd., and A. E. Wilson. September 3rd, 1928. (Cognate application, 4,628/29.) (321,266.)

25,261. "Fuse boxes for use in electric circuits." Callender's Cable and Construction Co., Ltd., and A. E. Wilson. September 3rd, 1928. (321,267.)

25,484. "Electric lamps." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). September 5th, 1928. (321,271.)

25,727. "Electrostatic acoustic device." Newcombe-Hawley, Inc. March 12th, 1928. (307,734.

25,728. "Electrostatic sound reproducers." Newcombe-Hawley, Inc. July 11th, 1928. (315,294.)

26,713. "Electric heating and cooking apparatus." I. T. Stokes and A. G. Ionides. September 18th, 1928. (321,278.)

26,982. "Apparatus for use in electric arc welding." Quasi-Arc Co., Ltd., and R. J. Musto. September 20th, 1928. (321,279.)

27,113. "Electrical cut-outs." General Electric Co., Ltd. September 30th, 1927. (297,833.)

27,350. "Devices for the automatic control and regulation of temperature in electric heating and cooking apparatus." G. B. M. Kelp and M. H. Jessen. September 24th, 1928. (321,280.)

27,898. "Electric switches." British Thomson-Houston Co., Ltd. September 29th, 1927. (297,846.)

29,004. "Induction motors." British Thomson-Houston Co., Ltd. October 11th, 1927. (298,567.)

29,271. "Heating buildings by electricity." W. C. King. October 11th, 1928. (321,299.)

29,872. "Fire-alarm systems in conjunction with telephone-exchange systems." Relay Automatic Telephone Co., Ltd., and T. M. Inman. October 16th, 1928. (321,303.)

31,177. "Automatic electric switches." C. Hall. October 27th, 1928. (321,318.)

32,697. "Electromagnetic vibratory devices for acoustical instruments." Wireless Music, Ltd., and M. Trouton. November 8th, 1928. (321,327.)

33,812. "Electrical conductors." Gramophone Co., Ltd., C. O. Browne, W. F. Tedham. November 17th, 1928. (321,335.)

34,802. "Engine starters." M. P. Whitney. November 26th, 1928. (321,342.)

34,803. "Engine starters." Eclipse Machine Co. April 5th, 1928. (309,117.)

37,701. "Explosion pots for oil switches." International General Electric Co., Inc. December 24th, 1927. (Addition to 300,650.) (303,010.)

1929.

532. "Electric fluid heaters." F. W. Golby (Red Spot Electric Co., Inc.). January 7th, 1929. (321,357.)

1,835. "Electric incandescent lamps." M. Leff. January 18th, 1929. (321,360.)

2,953. "Means for leading-in electric conductors through metal walls." R. Bosch Akt. Ges. February 27th, 1928. (306,894.)

3,407. "Electrically-operated toy railways and the like." A. Schuhmann. February 1st, 1929. (321,368.)

4,616. "Electric melting furnace." Electric Furnace Co., Ltd. February 11th, 1928. (305,952.)

6,074. "Electric cables." C. Cremer. September 20th, 1928. (319,315.)

7,034. "Picture and the like radio-transmission systems." Telefunken Ges. für Drahtlose Telegraphie. March 3rd, 1928. (307,309.)

8,893. "Metallic-vapour lamps." J. C. Pole. March 20th, 1928. (308,262.)

18,905. "Directional aerials for the transmission and/or reception of electromagnetic waves." W. E. Williams. November 9th, 1928. (Divided application on 317,301.) (321,385.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 20th:—

S. S. Siemens-Schuckert (lettering and design). Nos. 487,003, 487,005, 487,006, and 487,007. All goods in Classes 6, 13, 18 and 22; and S. S. Siemens (lettering and design). Nos. 496,828 and 496,829. All goods in Classes 6 and 8.—Siemens-Schuckertwerke Gesellschaft, Siemensstadt, Berlin. (British representatives: Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.).

Epoch. Nos. 506,674 and 506,675. All goods in Classes 6 and 18.—Electrolux, Ltd., 153-155, Regent Street, W.1.

D.P. No. 503,296. Class 8. Electric batteries (not for medical purposes).—D.P. Battery Co., Ltd., Bakewell, Derbyshire.

Trichord. No. 505,825. Class 8. Radio-telephonic apparatus and parts thereof, &c.—British Homophone Co., Ltd., 67-69, City Road, E.C.1.

Exwell. No. 506,681. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Erich Cahn, Aschaffenburg, Germany. (British representatives: Boult, Wade & Tennant, 112, Hatton Garden, E.C.1.).

Phœbus. No. 490,632. Class 13. Electric lamps (ordinary).—British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.

Semiscure. No. 506,711. Class 13. Electric lamps (ordinary).—Lunar Electrical Co., Ltd., 3-7, New Street Square, E.C.4

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ACCRINGTON.—Housing scheme (48), Hollins estate; H. Sanderson, borough engineer, Town Hall.

ACREFAIR.—School, for Denbighshire E.C.; W. D. Wiles, county architect, Wrexham (returnable deposit of £3 3s.).

ALTRINCHAM.—Town hall extensions (£8,000), for the U.D.C.; surveyor.

BARTON-ON-HUMBER.—Secondary school, for Lindsey E.C.; H. G. Gamble, county architect, Bank Street Chambers, Lincoln (returnable deposit of £3 3s.).

BATH.—Reconstruction of business stores, Bath Street, for McIlroy, Ltd.

BEDFORD.—Additional 130 houses, for the T.C.; borough surveyor.

BIRCOTES.—Cinema; J. H. Metcalfe, builder, Doncaster.

BLACKPOOL.—Station at Squires Gates and South Shore, for the L.M.S. Railway Co.

BOGNOR REGIS.—School, for West Sussex E.C.; director of education, Chichester.

BOLTON.—Extensions, tram repair depôt, Carlton Street; borough engineer. Stores, Hall estate; Bolton Co-operative Society, Ltd.

BUCKLOW.—Alterations and additions to sewage disposal works, Dunham Massey; R. C. Cordon, engineer and surveyor, 24-26, Station Buildings, Altrincham.

CARMARTHEN.—Cinema, for the Capitol (Carmarthen) Cinema, Ltd.; J. A. Lawrence, architect and surveyor, 1, Castle Street, Cardiff (deposit £2 2s.).

CAPE TOWN.—Air port (£60,000); Government and Corporation.

CHEADLE AND GATLEY.—Extensions, Council offices, for the U.D.C.; J. Holt, architect, 49, Deansgate, Manchester (returnable deposit of £1 1s.).

CHEADLE (STAFFS.).—Houses (100), Brookhouses, for the Berry Hill Collieries, Ltd.

CHESTERFIELD.—William Rhodes School, Boythorpe (438 places); Dr. H. G. Stead, chief education officer.

CHINGFORD.—Additional 40 houses, for the U.D.C.; surveyor.

COLCHESTER.—Offices, &c. (£10,000), for the T.C.; borough surveyor.

COVENTRY.—Housing scheme (286), for the T.C.; A. F. Underhill, housing director (returnable deposit of £5 5s.).

DAGENHAM.—Secondary school, Parsloes Avenue; Essex E.C.

DONCASTER.—Sewage disposal works, Braithwell; surveyor to R.D.C. Model dairy, warehouse, and packing factory, York Road, for the Co-operative Society; E. G. Brown, secretary.

EDINBURGH.—Additions to premises and plant (£30,000), for Bruce Peebles & Co., Ltd.

ESTON.—Secondary school; North Riding E.C.

ETON.—Rebuilding premises, for Eton College; Mr. Fisher, architect.

FAVERSHAM.—Houses (68), London Road site, for T.C.; borough surveyor.

FIFESHIRE.—Additions to Bell-Baxter School, with electric lighting (£30,000); G. Sandilands, architect, Fife Education Authority, Kirkcaldy.

GLASGOW.—Houses (280) at Haghill, for Corporation; architect, Housing Department. Machine shop, for Wilson Bros. Pipe Fittings, Ltd., 100, Fordneuk Street; the manager.

GOLBORNE.—Additional 52 houses, for the U.D.C.; surveyor.

GOSPORT.—School, for the borough E.C.; director of education.

GUILDFORD.—Shops (6), High Street; F. Scott.

HALESOWEN.—Houses (215), for the U.D.C.; E. L. Lewis, builder. Extensions, Grammar School, for the Worcestershire E.C.; A. T. Butler, architect, 31, Priory Street, Dudley.

HALIFAX.—Erection of Girls' High School, Craven Lodge, with electrical work; A. C. Tipple, borough engineer, Crossley Street (deposit £2 2s.).

HAYWARD'S HEATH.—Houses (56), for the U.D.C.; W. Tickner, builder, Worthing.

HORTON.—Ward extension, mental hospital; L.C.C. architect.

IRISH FREE STATE (KERRY).—Conversion of workhouse in Tralee to hospital, for the County Board of Health (£9,278); E. W. Murphy, borough engineer, Dublin.

KIDSGROVE.—Two schools (1,000 places), for Staffs. E.C.; E. Joy, clerk, Stafford.

KILMARNOCK.—Housing scheme (40), for the T.C.; T. C. Stewart, Clydesdale Bank Chambers.

KIRKINTILLOCH.—Extension of Broomhill Home; the medical superintendent.

KIRRIEMUIR.—Housing scheme; burgh surveyor.

LEEDS.—Construction of municipal buildings, The Headrows (£360,000); city engineer.

LINCOLN.—Extensions to engineering department, Technical College (£11,000); W. S. Watkins, architect, St. Edmund's Chambers, Silver Street.

LIVERPOOL.—Stadium; land steward and surveyor, Municipal Buildings, Dale Street.

LONDON (BECONTREE, E.).—Technical and secondary schools, L.C.C. housing estate, for Essex C.C.; director of education, Chelmsford.

(SHOREDITCH, E.).—Reconstruction, Drysdale Street area; dental hospital and health offices, Laburnum Street; borough engineer.

(ST. PANCRAS, N.).—Reconstruction of 357, Euston Road, and 44, Warren Street; M. K. Matthews, architect.

(TOOTING, S.W.).—Cinema, Mitcham, Road; G. Masey, architect. Alterations and additions, 149-155, Mitcham Road; Myall Bros.

(PUTNEY, S.W.).—Reconstruction, Putney Bridge, for the L.C.C.

(FULHAM, S.W.).—Wesleyan school, Munster Park (£7,500); trustees. Premises, adjoining power station (£33,000); Shell-Mex, Ltd. Building at corner of Hammersmith Road and Addison Bridge Place; W. E. Sanders. Buildings, Parsons Green Lane and Beaconsfield Road; S. J. Watson.

MAIDSTONE.—New buildings, for grammar school for girls; Kent E.C.

MILNROW.—Housing scheme (50); A. S. Whipp, surveyor to U.D.C.

MARLBOROUGH.—Extensions, grammar school, for Wilts. E.C.; Mr. Pullinger, director of education, Trowbridge.

NORTHALLERTON.—Post office (£10,000), for H.M. Office of Works, King Charles Street, London, S.W.

NORTHFLEET.—Warehouse and offices; Henley's Tyre and Rubber Co., Ltd.

NOTTINGHAM.—Operating theatre at the General Hospital (£7,000); Evans, Clarke & Wollatt, architects, Eldon Chambers, Wheeler Gate.

OLDHAM.—School (850 places), Limeside, for the borough E.C.; J. J. Williams, clerk.

PAIGNTON.—Alterations and additions, Gerston Hotel; J. S. Huggins.

PAISLEY.—Alterations to garage, for Scottish General Transport Co., Ltd., Kilmarnock; the manager.

PERSHORE.—Central school, for Worcestershire E.C.; director of education, Worcester.

PURFLEET.—Additional 200 houses, for the U.D.C.; surveyor. Works extensions, for Jurgens, Ltd.

RANSON.—Extensions, sanatorium; Notts C.C.

RETFORD.—Two new schools and extensions to Thrumpton school, for the E.C. (£31,800).

ROCHDALE.—Waterworks at Wardle; borough waterworks engineer.

RUGBY.—Improvements, Rugby Hospital (£20,000); superintendent.

ST. HELENS (LANCS.).—Housing scheme, for the Council of Christian Witness; W. B. Fletcher, architect, George Street.

SOUTHEND-ON-SEA.—Factory, Priory Crescent, for E. K. Cole, Ltd.

SPALDING.—Housing scheme (31), for the U.D.C.; A. E. Palmer, architect, 1a, Pinchbeck Street (returnable deposit of £1 1s.).

TREDEGAR.—Station (£12,000), for the L.M.S. Railway Co.

WATFORD.—School (400 places), Leggatt's Way, for Herts. E.C.; C. E. Longmore, clerk, Hertford. Extensions, Children's Homes, for the Board of Guardians; F. Wilson, clerk (returnable deposit of £2).

YEOVIL.—Garage, &c. (£20,000), Clarence Street, for Douglas Seaton, Ltd., London, W.